Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

Vol. 5. February 1923 No. 2

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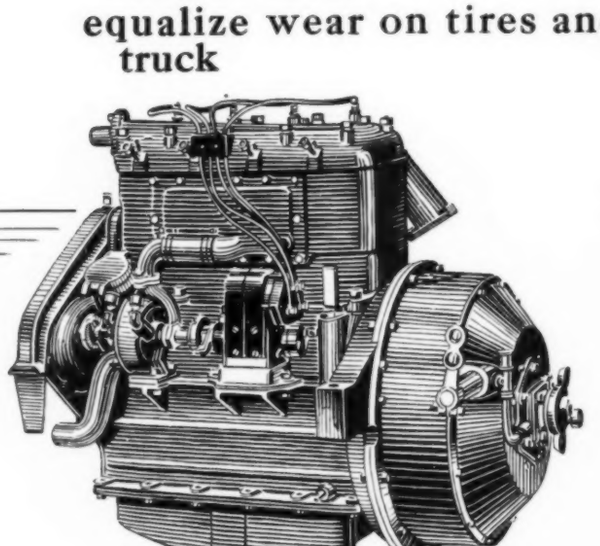

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Successful Methods

A Magazine of Construction Service

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An Unqualified Success

THE 1923 convention and road show of the American Road Builders' Association at Chicago were successful beyond all expectation.

About six thousand engineers, officials, contractors and others in the highway industry registered. This was nearly three times the number that had registered at any previous meeting of the association. An estimate based on a limited investigation among the crowd indicated that not more than 40 per cent of those in attendance registered. It therefore seems safe to state that at least twelve thousand people went to Chicago to attend the big dual events of the year in the highway industry. The attendance also was unusually representative of all parts of the country and of all branches of the industry.

The road show was unquestionably one of the greatest industrial machinery exhibitions since the World's Fair in Chicago in 1893. In fact, nothing like such a collection of road-building and material-handling machinery ever had previously been assembled anywhere at any time.

One of the notable features of the road show was the increased size of the machinery units as compared with those shown in former years. The great improvement in the design and construction of the machines exhibited also was very evident. In fact, many of the machines shown have been mechanically refined to an extent which would not have appeared practicable a few years ago.

The convention program was the most gratifying surprise of the week to those who attended. In recent years the annual convention of the association has not measured up to the needs of the highway industry. This year the papers presented and the discussions that took place were so excellent that proper reference to them might appear as an exaggeration. In a word, the present administration of the association in one year has brought the character of the convention a long way toward the required standard.

During the week the American Road Builders' Association announced that its next annual convention and road show would be held January 14 to 19, 1924, at Chicago. The great success of these dual events this year seems to assure even better results next year.

T. J. Wasser, president of the American Road Builders' Association, who is also State highway engineer of New Jersey, and his very efficient convention and road show committee, of which Charles M. Upham, State highway engineer of North Carolina, was chairman, deserve the thanks of the entire highway industry for the results they secured.

Deliveries

SEVERAL times in the last few years contractors have gone broke all over the country because they could not get materials or equipment as they expected. Right now we appear to be at the beginning of one of the worst delivery situations we have ever faced. In spite of the experiences of the past, and the outlook for the immediate future, there is comparatively little buying now for delivery later.

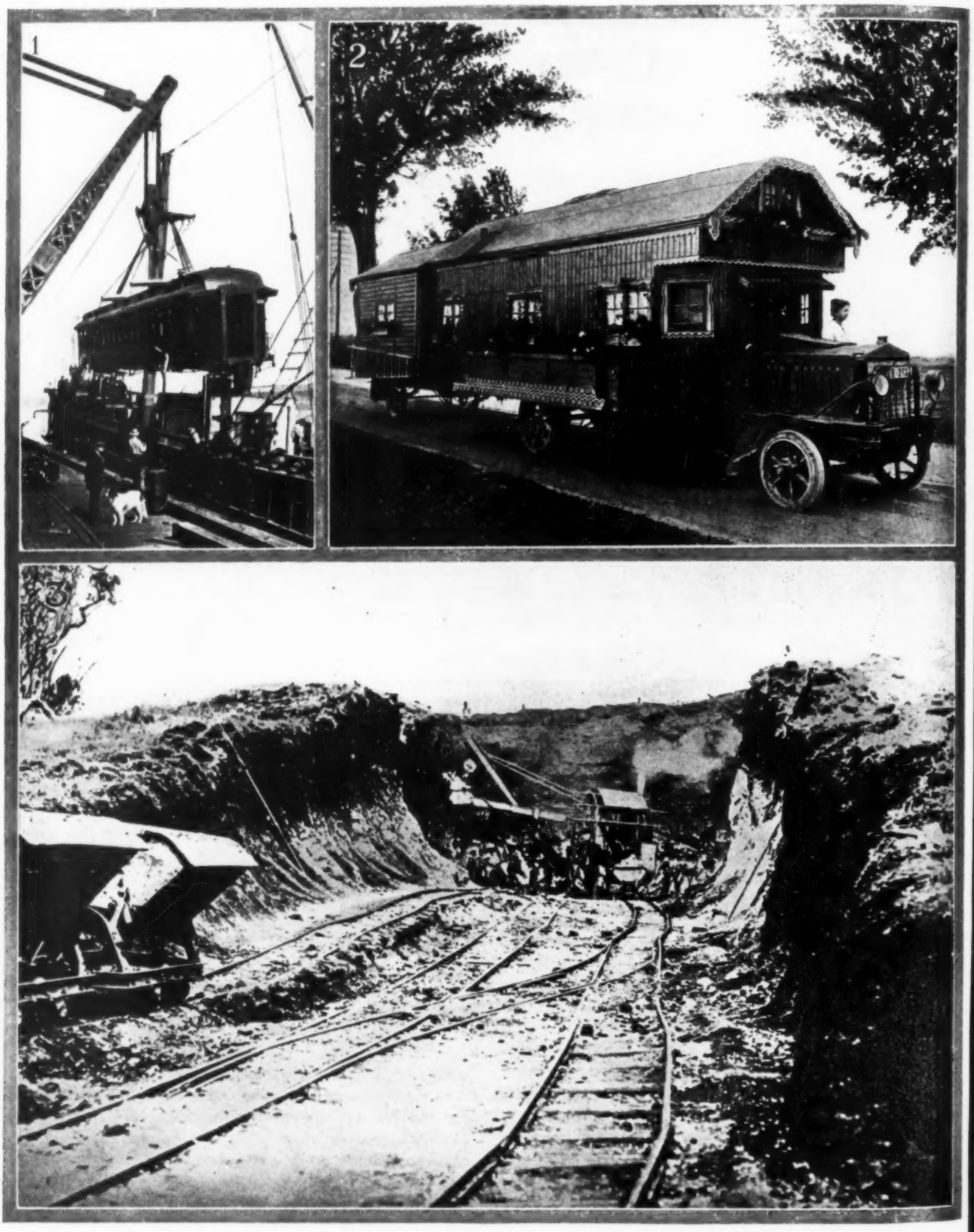
Construction men are frequently accused by bankers of being gamblers. They have too general a reputation, which is largely undeserved, of taking a long chance. If ever such chances were taken it seems that those who hold off buying now, because of price uncertainties, are playing the longest odds on which they have ever laid a bet in their business.

Next April, May and June there will almost certainly be a mad scramble for equipment and material deliveries on new contracts. This can only result in skyrocketing prices and disappointments on shipment. During the next thirty days the long heads who have not already protected themselves will get under cover.

A Record Winter's Work

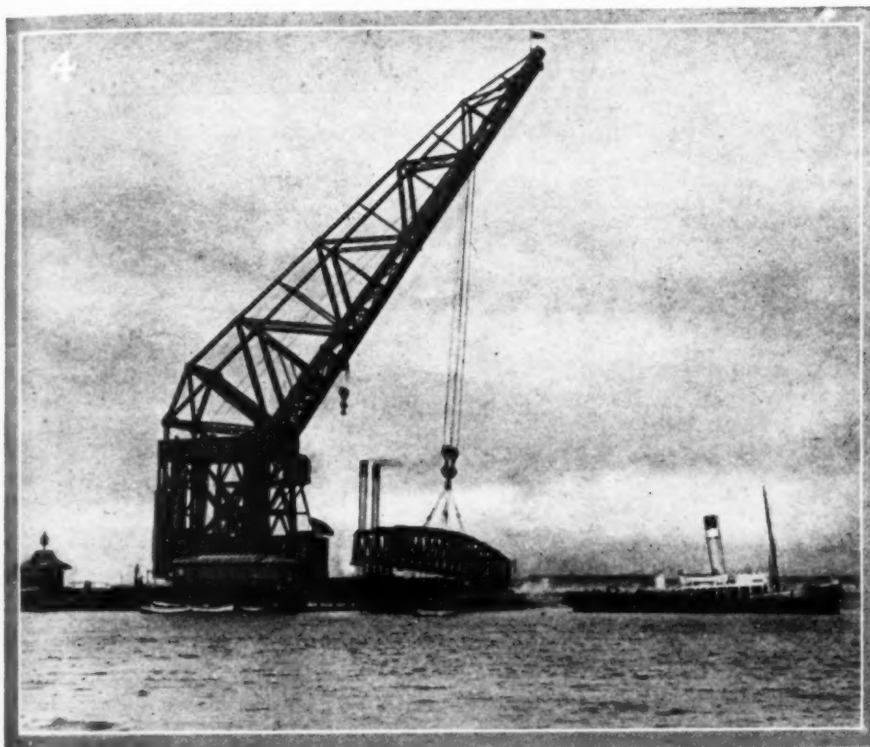
THIS winter will certainly establish a record for all time for the amount of outdoor construction work done after what is generally considered the end of the season. The mild weather the country over has favored the situation wonderfully. The demand for early completion of many jobs has been such, however, that much of the work done would have been put through anyway. The old belief that it was necessary to shut down in the fall has been weakened a lot in recent years by experience. Of course, certain kinds of concrete placing are impracticable where there is frost. Road surfacing also is rarely advisable during freezing temperatures. But each year in States where the winters are severe we see more and more work carried right on almost without hindrance from the weather. Some unit costs on winter work may be higher than in mild weather, but the advantages of spreading overhead over a longer period of each year and of getting the job done quicker must not be overlooked.

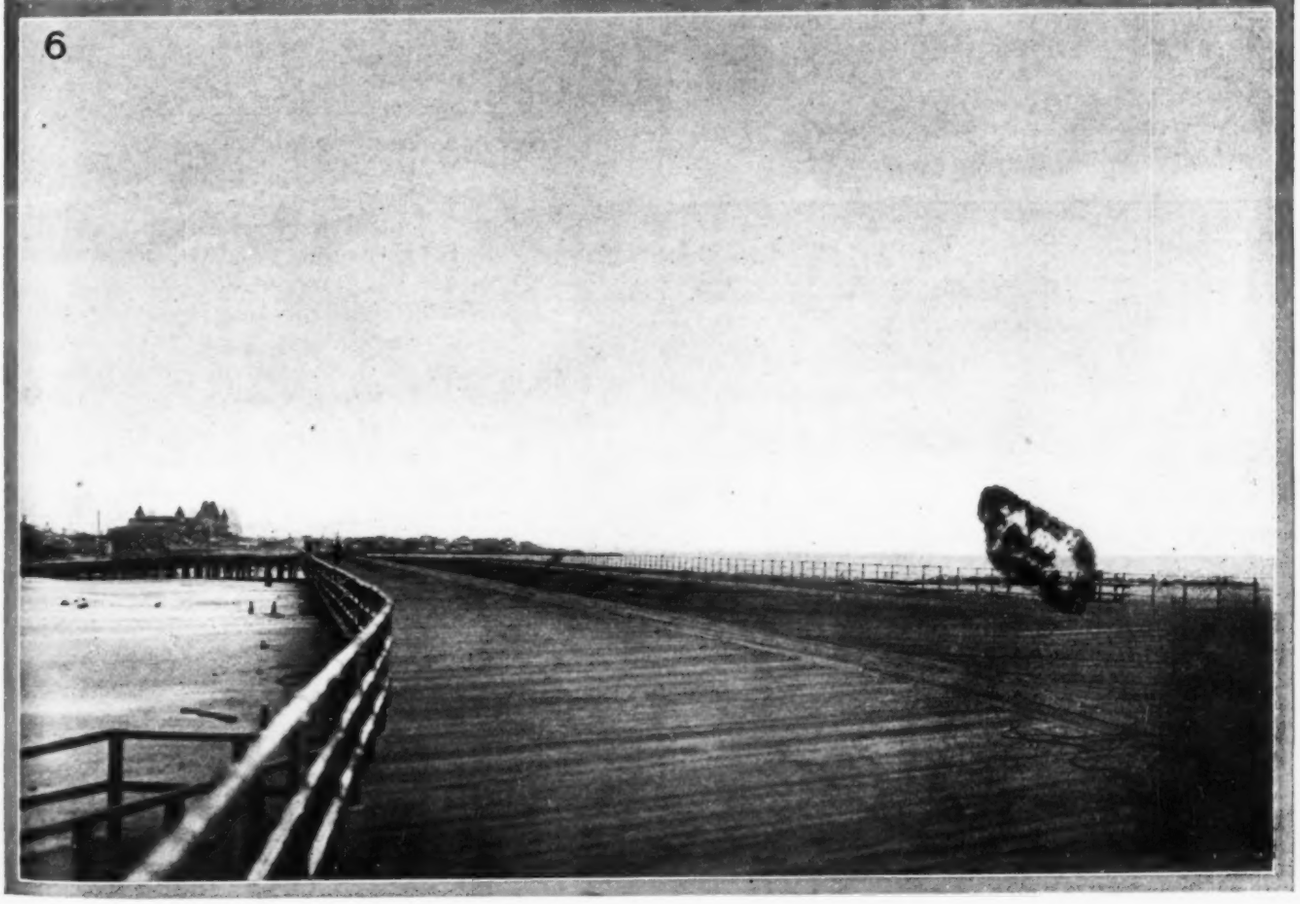
Solving Traffic Problems



1—All the comforts of the homeland are to be provided on the U. S. Government railway in Alaska. This photograph shows a sleeping car ready for a voyage to Seward. © *P. & A.*
2—This palatial automobile home and traveling candy store is a native of Austria. © *Central News*
3—A construction scene on a British built railway through a mountainous section of Africa. © *International*

By Various Methods





4—Taking an English bridge to the repair shop. This structure weighing 150 tons was picked up by the floating crane and towed down the Mersey River to Seacombe. © *International*

5—Here is the way they build bridges in Thibet. © *International*

6—Ready for the summer throngs. The new boardwalk at Coney Island built on concrete piles. © *International*

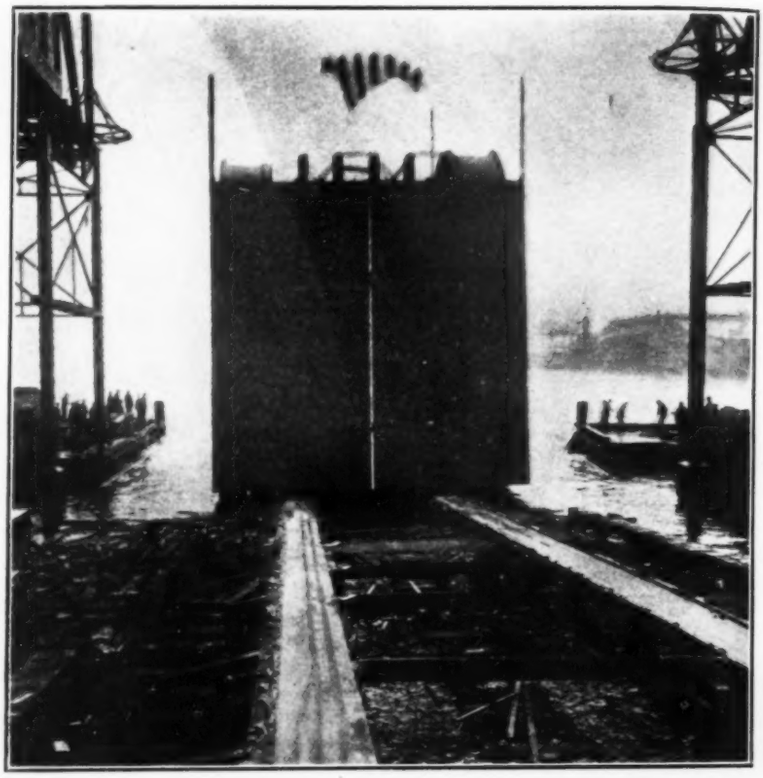
NEW YORK AND NEW JERSEY VEHICULAR TUNNEL

Highly Equipped and Specialized Plant Provided for Under-River Highway

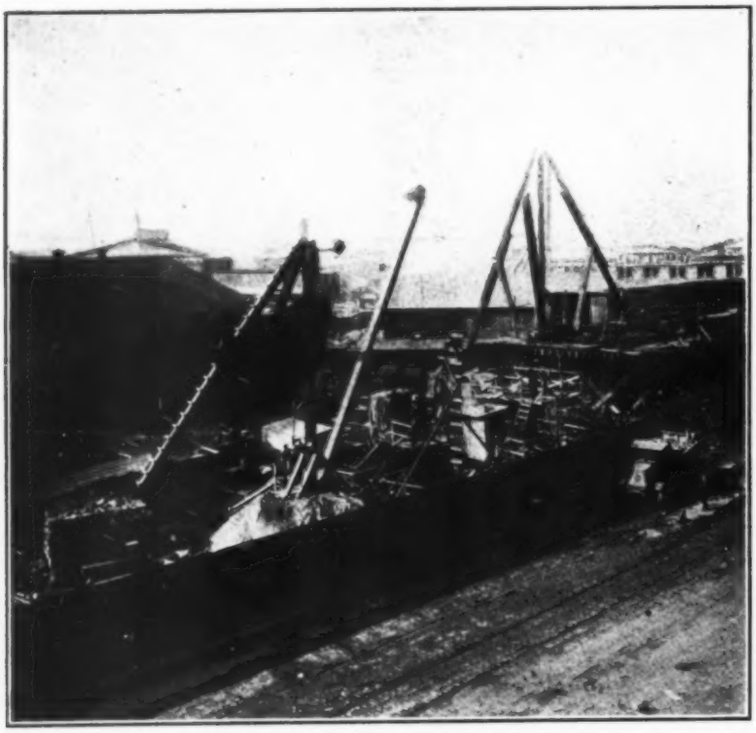
By Robert S. Arthur

IN these days of advanced highway construction, the 40 ft. roadway which Booth & Flinn are building under the Hudson River for a distance of 9250 ft. inside of two cast iron cylinders 29 ft. 6 in. in diameter, should not be overlooked. Since the letting of the contract for $19,331,723 in March, 1922, the designing and assembling of plant has been going on until now it is probably the most highly equipped piece of construction work being done in the world.

Six shields, designed and built specially to function in the river silt peculiar to New York Harbor, are in the course of construction. Two are already in use and 4 more will be working by June of this year. The cast iron segments with which the tunnel is lined, measuring 6 ft. in length and 30 in. in width and weighing 1½ tons each, are of such size that the ordinary air locks and equipment cannot be used. Consequently, new segment locks and all equipment upon which they depend had to be built. Two power houses, one on each side of the river, furnish the compressed air and hydraulic power. The New York power house has 5 low air compressors and the New Jersey power house has 7 low air compressors. In addition each plant has two 1500 ft. per minute high pressure machines to furnish the air for riveting, grouting, etc. The low pressure machines are used in the actual tunnel for breathing, keeping out water, etc.



RIVER SHAFT CAISSON SLIDING DOWN WAYS



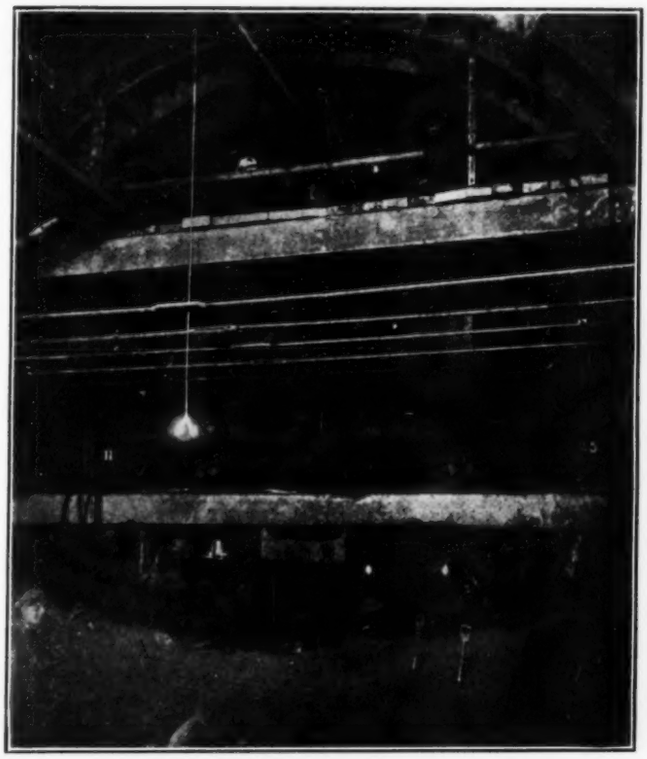
SHAFT SITE AT CANAL ST., NEW YORK CITY

The contractors have two separate sources of electric power: one from the New York Edison Company and one from the United Electric Company. Their power house equipment also consists of 3 hydraulic pumps which maintain a pressure of 5000 lb. per sq. in. used on the 30 jacks which drive each shield ahead. The lower picture shows a general view of the Canal Street shaft, New York. On the Jersey side two additional shafts on land are being sunk and will be ready for shields about February 15. The four river shafts, two on the New York side and two on the New Jersey side, are being built on Staten Island and will be towed and sunk in place. In all there are seven shafts. The upper view shows a launching of one of the caissons.

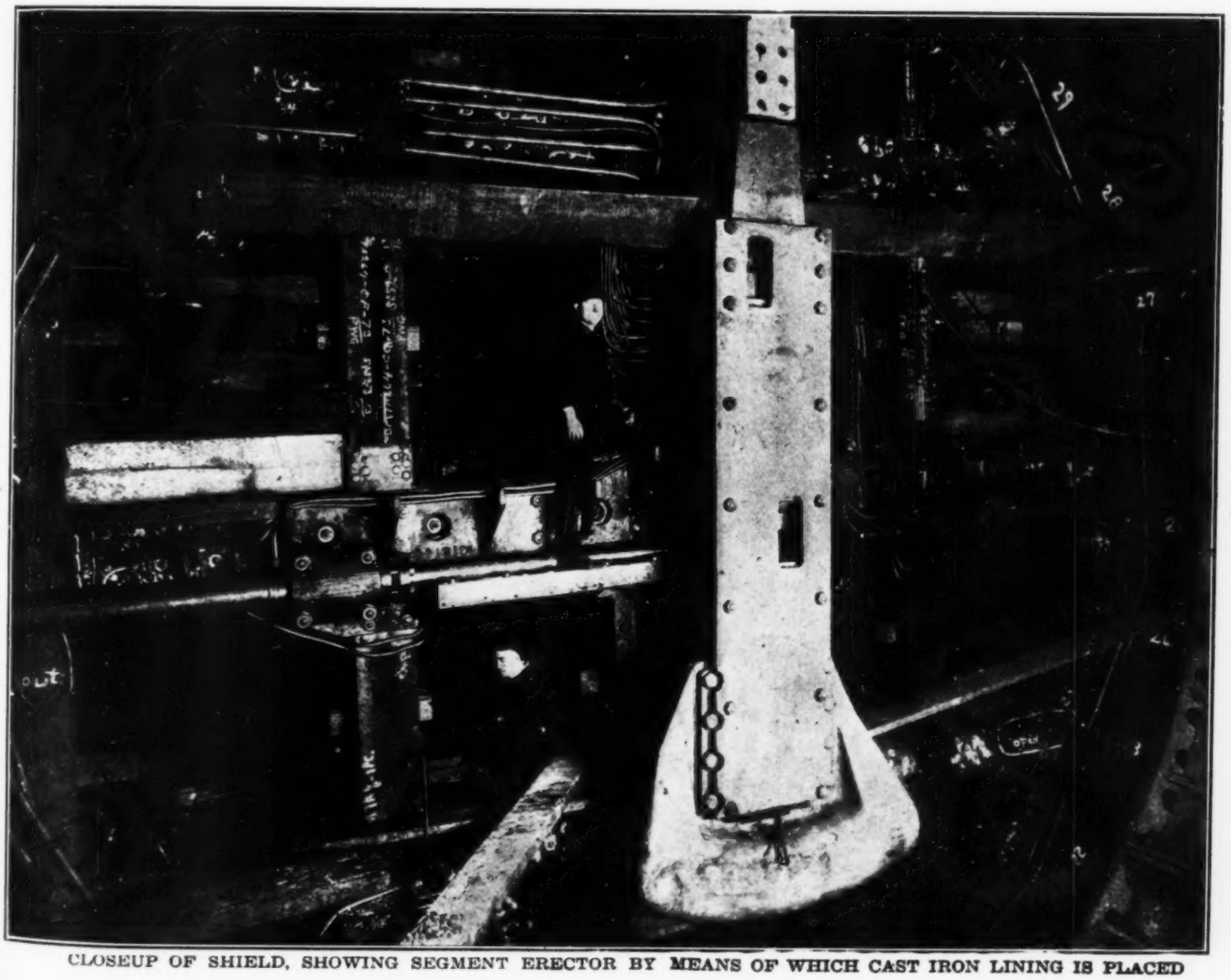
All excavated material and all supplies and materials entering the tunnel will be carried down in cages, two to each shaft operated by counter balances. Specially

designed hoists having a capacity of 20,000 lb. at a speed of 200 ft. per min. are used for the cages. On the New York side all material is received by river and unloaded on the pier. A crane handles the material to an overhead industrial track which runs to the shafts, as shown in the lower photograph on page 4. All the excavated material is carried to the barges over 36-in. gage electrically operated track and the material to be brought in passes through air locks and runs over the same track to the working chamber. So far all actual excavation has been made by hand. A similar plant is located on the Jersey side.

The tunnel consists of two cast-iron cylinders 29 ft. 6 in. in external diameter lined with concrete and with an interlining of tile. Each tube will have a 20-ft. roadway and 2 ft. 6 in. sidewalk for pedestrians. There will be 13 ft. of headroom, with a fresh air compartment at the bottom and an exhaust air compartment at the top. After 3 years of investigation and research work a system of ventilation has been adopted which will limit the carbon monoxide to 4 parts in 10,000. Air will be changed 40 times per hour and 3,600,000 cu. ft. of air per minute can be supplied when the tunnel is being operated to capacity. No longitudinal movement of air will take



SHIELD SHOWING RINGS IN PLACE



CLOSEUP OF SHIELD, SHOWING SEGMENT ERECTOR BY MEANS OF WHICH CAST IRON LINING IS PLACED

place, all being in a transverse direction to the air chambers which reduces the fire hazard to a minimum.

The estimated maximum daily capacity of the tunnels will be 46,000 vehicles, or twice the present traffic carried on the 14 ferries between the Battery and Dyckman Street. The maximum depth of the top of the tunnel below mean high water will be 72 ft. The tunnel will have from 10 to 35 ft. of cover in the river.

The views on page five show the shield in place. This shield is shoved forward and controlled by means of some 30 jacks, which use the cast iron lining for a reaction. The alignment of the shield may be controlled within ¼ in. by proper manipulation of these jacks.

© Keystone

SHOWING 250-FT. PILE IN PLACE

In the illustration at bottom of page five is shown a vertical arm by means of which the 6-ft. segments are placed. This arm picks up the segments, rotates and moves the segments into place. At the top of page 5 is shown the muckers at work handling the excavation. It is hoped by the contractors that later they will be able to force the shield ahead mole-fashion so that the silt under the river bed will be largely displaced and not have to be handled up through the locks. At the present time the rate of progress of one shield is two rings of segment or 5 ft. per day, and up to the present 212 ft. of tunnel have been completed and cast iron lining placed.

The illustrations on this page show the method used for sinking 84 piles consisting of 24-in. steel pipe 250 ft. long. After sinking, reinforcing and concrete were used to within 110 ft. of mean high water and 110 ft. cut off and pulled. These are to be the bearing piles for the New Jersey River shaft caissons. The photograph at the top of the page shows the piling being cleaned of mud with a well driller. The pipe in this picture has been sunk 250 ft. and the derrick disconnected. The picture at the bottom of the page shows the derricks in place for sinking pipes.

This method of sinking foundation piles coupled with the great length of the piles is unusual on construction work and SUCCESSFUL METHODS will print a more detailed description of it in a later issue.

The work is being done under the supervision of the New York State Bridge and Tunnel Commission and the New Jersey State Bridge and Tunnel Commission. Clifford M. Holland is chief engineer, Milton Freeman, engineer of construction, and Ole Singstad, designing engineer. Booth & Flinn, Inc., are the contractors. M. E. Chamberlain is chief engineer. M. A. Hjort is electrical and mechanical engineer. M. Quinn is general superintendent on contract No. 3, New York side, and L. Tallman general superintendent of contract No. 4, the Jersey side. At the present time 220 lin. ft. of tunnel are completed and work is estimated to be fully completed three years from April, 1922. While there are tunnels with equal or greater diameter, there is none comparable in length, and it is the largest subaqueous tunnel all points taken together in the world. In diameter it is comparable with the City of South London tunnel, which has a diameter of 30 ft. in clay. The Rotherhithe tunnel in London has a diameter of 30 ft. The largest section of the Vehicular Tunnel is 30 ft. 4 in., while the general cross section is 29 ft. 6 in.

© Keystone

PLANT FOR SINKING 24-IN. STEEL PIPES 250-FT. LONG

HOW OHIO REDUCED ITS ROAD MAINTENANCE BILL

State Department by Changing Specifications Able to Cut Costs of Taking Care of Highways

By E. C. Blosser,
State Highway Engineer

WHEN the present State Highway Department of Ohio took office it found a high maintenance cost due to the standard thickness of past years being unable to withstand the present day motor traffic. The construction engineers began investigating the reasons for the failures and immediately changed their design for new work. Economic construction was necessary, but heavy enough pavements also were necessary and finally thicknesses for various types were decided upon that would stand up under punishment and at the same time not be prohibitive in first cost. At the same time the maintenance costs were not overlooked so that construction money would have to be diverted in a few years to the repair fund.

In designing for waterbound macadam it was decided that 10 in. was necessary, built in two courses, and this on roads that did not receive heavy truck traffic. Immediately after construction, a surface treatment is applied to keep the pavement from raveling.

Bituminous macadam roads are constructed in 3 courses. The 2-base courses are of waterbound macadam of a total of 8 in. The 3-in. bituminous macadam wearing surface has a penetration of from 2½ to 3 gal. of tar or asphalt to the square yard. On very heavily traveled highways the total thickness has been increased to 13 in.

The minimum thickness of plain concrete is usually 9 in. Some sections have been built with 10 in. on center and 8 in. on the sides. Reinforced concrete pavements are being built in the majority of cases 8 in. thick.

Ohio has three types of reinforcing material, a mesh reinforcement that has an effective strength of 56 lb. to the 100 sq. ft.; a ½-in. bar reinforcement of 75 lb. to the 100 sq. ft. and an assembled unit of ⅜-in. bars having an effective strength of 63 lb. to the 100 sq. ft.

The type used depends on the local condition and traffic on that particular section. This year's specifications makes it mandatory that a finishing machine be used on all contracts over 1½ miles in length. Concrete pavements have been built from various aggregates. The specifications allow either washed gravel, limestone or slag to be used for the coarse aggregate. Excellent pavements have been constructed out of all three types. The use of a finishing machine makes it necessary that slag concrete be of the right consistency to insure an even and smooth surface and overcome pitting.

Brick pavements are being constructed on 8 in. of waterbound macadam where limestone is available and on 6 in. of plain concrete and 5½ in. of reinforced concrete where conditions so demand. The cushion is either sand or granulated slag. Three-and-one-half

USEFUL AS WELL AS ORNAMENTAL. THE OHIO STATE FORCES BUILT THIS BRIDGE ACROSS THE MAHONING RIVER

in. and 4-in. brick are both used, and hillside brick is used on steep grades. In the past the State has used monolithic, semi-monolithic, grout-filled and bituminous-filled brick construction but has had the most success with bituminous-filled pavements. During 1922 most of the brick contracts have been let for

GUARD RAILINGS ON ROAD NEAR DAYTON

asphalt-filled brick. About 15 lb. to the square yard is being used.

Sheet asphalt pavements are 1½-in. binder and 1½-in. top on 8 in. of waterbound macadam or 7 in. of plain concrete. The contractor, when bidding, specifies either oil or natural lake asphalt.

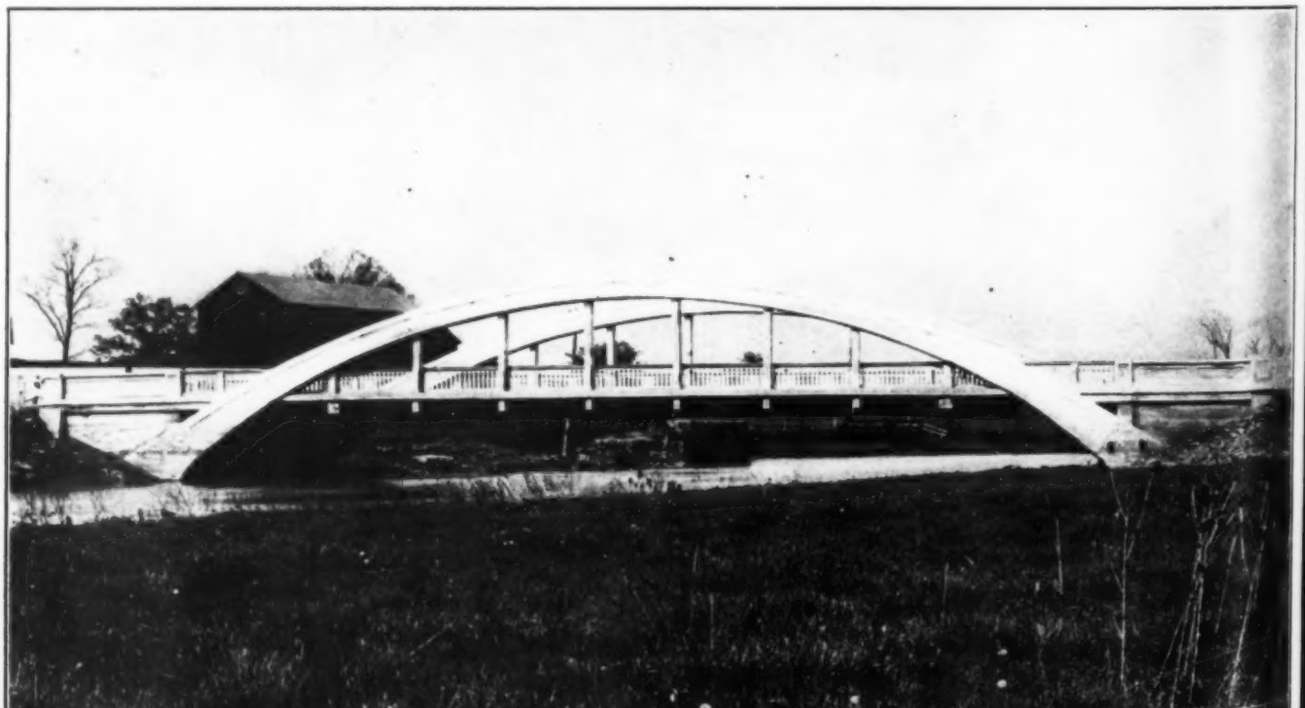
Bituminous concrete of modified Topeko mix is laid on 9 in. of waterbound macadam or 7 in. of concrete and is 2 in. thick.

Kentucky rock asphalt has been used in both new work and in re-surfacing. This material is placed in a 1½-in course running 133 lb. to the square yard.

Just recently the State has opened to traffic 15 miles of bituminous-filled brick pavement constructed by State forces under Major A. Stellhorn on the 3C Highway in Ashland and Knox counties. When the State forces entered on this work they found a narrow dirt highway containing 10 and 12 per cent grades. The grading was mostly steam shovel work. The roadway was widened to 28 ft. and an 18-ft. pavement constructed. Today this winding, rolling highway opens up one of the beautiful spots of Ohio and bids fair to be one of the main arteries of highway transportation of the State of Ohio.

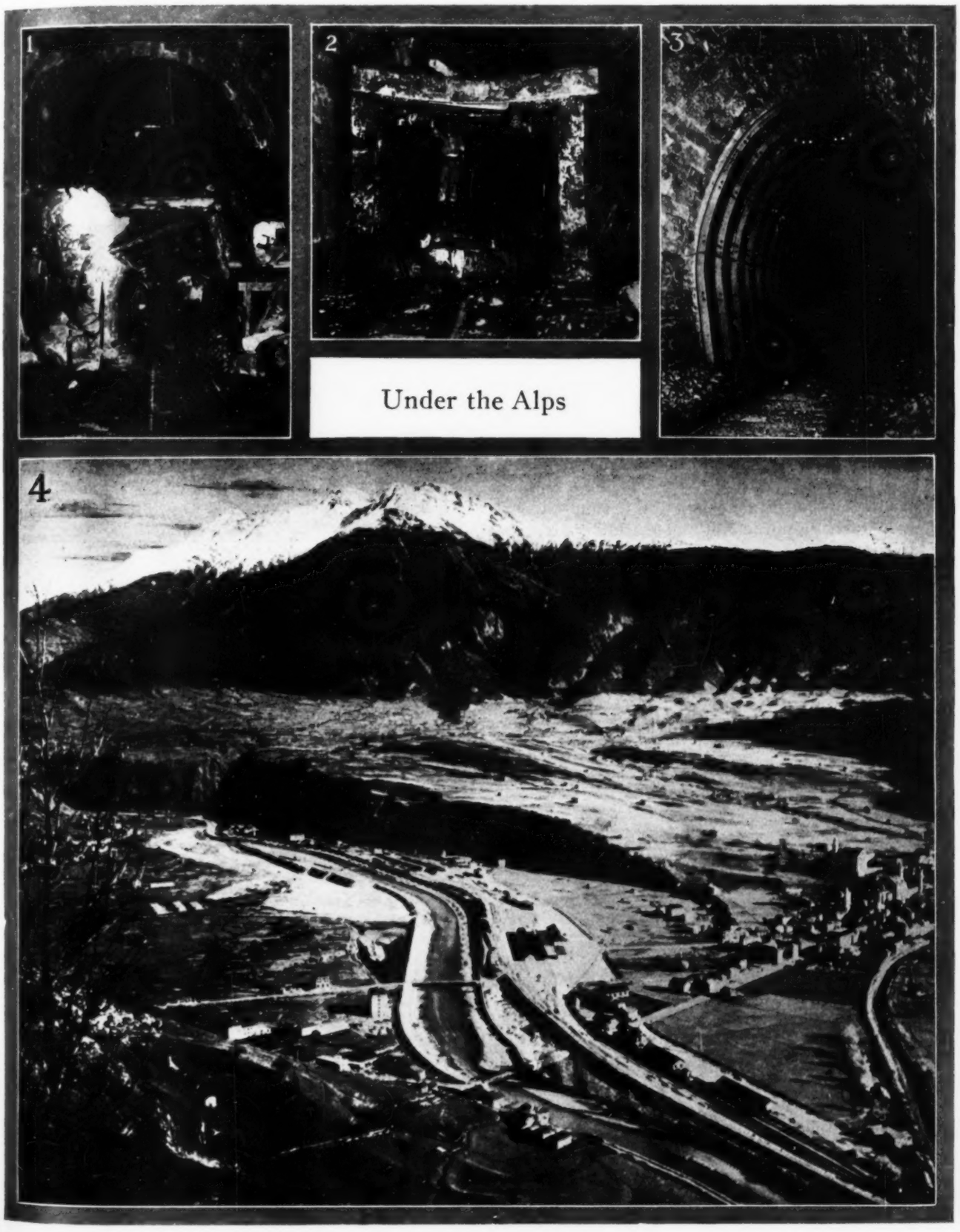
Ohio's highway department, under Leon C. Herrick, during the construction season of 1921 made a remarkable record in the building of hard-surfaced highways. At the beginning of 1921 there were 741 miles, unfinished, carried over from 1920 and during the year 380 miles in addition were awarded, making a total of 1121 miles under construction. Of this number 1022 miles were completed during the working season. Up to October, 1922, there were 1028 miles under contract but on account of the coal strike, the railroad strike and freight embargo, it was impossible to complete over 75 per cent of this mileage.

A SECTION OF REBUILT HIGHWAY IN CUYAHOGA COUNTY



ANOTHER OF THE HIGHWAY BRIDGES OF OHIO. THIS ONE IS IN CRAWFORD COUNTY

Simplon Tunnel Nears Completion



1—Construction work at mouth of tunnel.
2—Near the Italian end of the great passage beneath the Alps.
3—This photograph of a section of the finished tunnel shows the character of construction. Two single track tunnels have been bored through the rock.
4—One terminus of the twelve-mile tunnel, showing the Alp in the background. © *International*

AIR DUMP CARS IN THE MARBLE INDUSTRY

Used with Success in Handling Both Perfect and Imperfect Blocks

By C. P. Burton

SHOULD you visit West Rutland, Vt., where the greatest marble concern of the world, the Vermont Marble Company, owns one of the largest of marble deposits known, and ask to see a marble quarry,

FLAT CARS LOADED WITH MARBLE BLOCKS AT MOUTH OF QUARRY

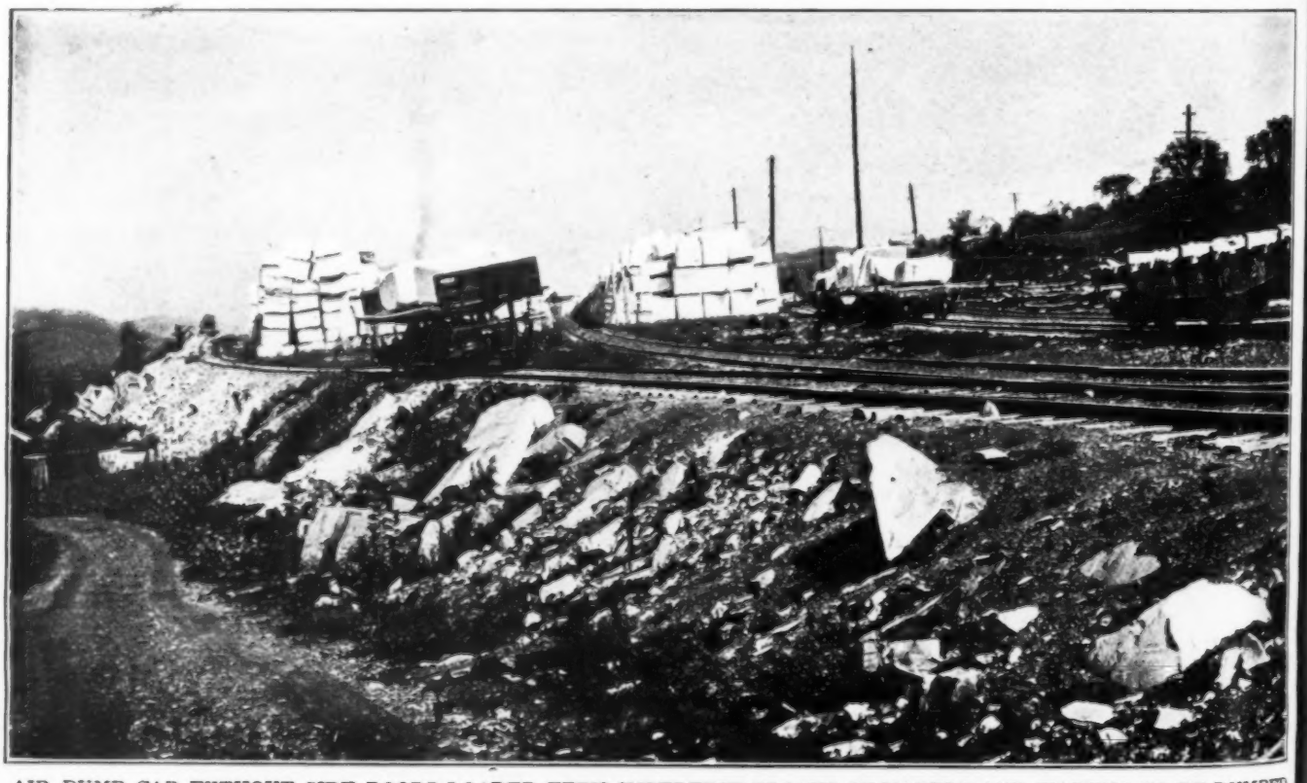
you would be shown a hole in the ground—a dozen holes, in fact. For the Rutland marble quarries are underground. They are in reality mines, with separate outlets at the surface but, as a result of tunneling operations, all merged into one, having a maximum depth of 300 ft. and an underground floor space 17 acres in extent.

These underground marble quarries at West Rutland are 3000 ft. long and have a maximum width of 700 ft. An electric railway operates on the floor of the quarry 300 ft. below the surface and stretches 800 ft. into the tunnel. Connecting with this electric railway and leading up to the ground level is a cable track 500 ft. long and rising at an angle of 45 deg.

The blocks are cut out by means of an electric channeling machine, which runs on a movable track laid on the floor of the quarry. Huge derricks lift

LARGE BLOCKS OF MARBLE DUMPED BY THIS 30-YD. CAR

the blocks to the surface, for storage until needed for manufacture. Occasionally a marble block is taken out which for some reason is not marketable. How to dispose of this heavy cube of stone with the least



AIR DUMP CAR WITHOUT SIDE DOORS LOADED WITH IMPERFECT BLOCKS OF MARBLE AND WAITING TO BE DUMPED

A HUGE BLOCK OF MARBLE READY TO BE LIFTED TO THE SURFACE BY MEANS OF A DERRICK

possible expenditure of time and labor, both of which spell money, has been no small problem. Formerly the imperfect blocks were dumped by hand from flat cars, with the aid of rollers and bars.

All this did not accord with the Vermont idea of economy. The company already was using 16-yd. air dump cars for hauling marble chips from the quarry to their crushing plant and lime kilns for conversion into lime at the rate of 75 tons of lime a day. Naturally the same cars would have been used for handling the imperfect marble blocks but for the impossibility of passing the huge 7½-ft. cubes under the car doors in dumping.

Then someone had an idea. Side doors were not necessary in handling huge blocks of stone. Why not use air dump cars without side-dump doors, tip the bed and let the blocks slide off. This was done. The largest size of cars made were purchased—steel air dump cars of 30 cu. yd. capacity—built without side doors. Now 40 to 50 tons of imperfect marble blocks are loaded upon a car, taken out to the dump and by "a simple twist of the wrist" sent thundering down the spoil bank in a moment's time.

It is worthy of note that the huge derricks by which the heavy blocks of marble are lifted from the underground quarry are made of Washington or Oregon fir, for the same reason that the best makes of contractors' dump wagons are made of the same material. It is as strong as oak and much lighter, saving weight without detracting from strength.

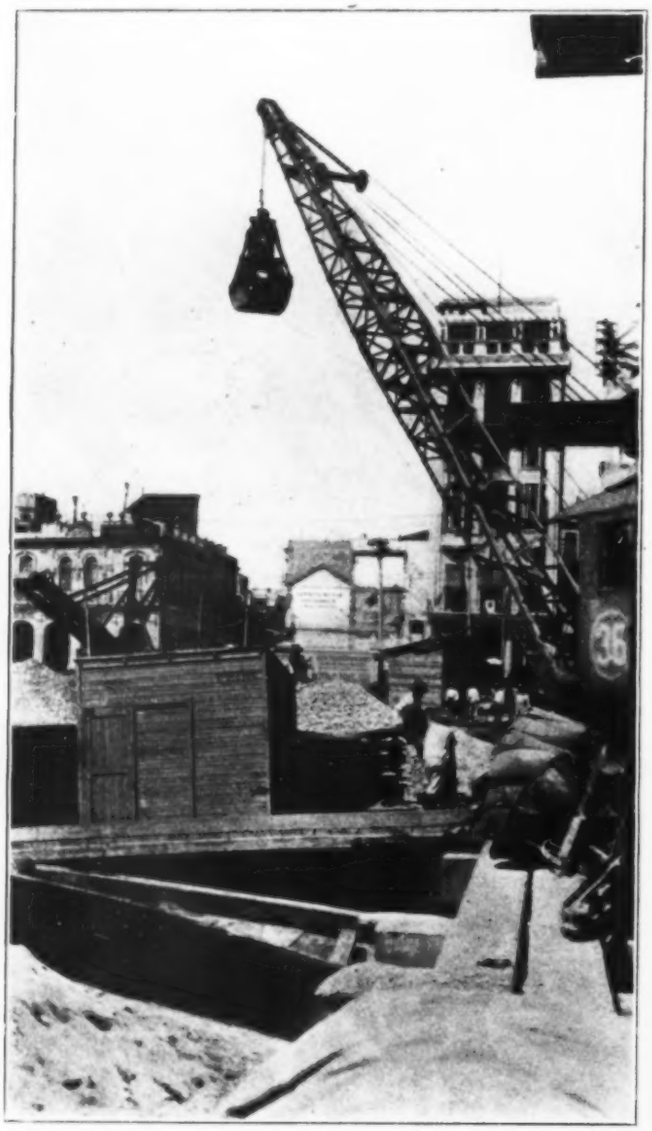
The perfect blocks, of course, are not dumped for fear of injury. They are taken on flat cars and carefully piled in a storage yard, where there are 10,000 great blocks of marble awaiting manufacture in a modern mill adjoining. This mill is built of steel and divided into compartments, each large enough to accommodate a large marble block for sawing and polishing. The sawing is done by means of small iron bands set in an iron frame and moved to and fro across the stone. Sand and water constantly pour over the block during the operation and the grit of the sand serves as teeth for the saw. One saw has teeth which are worth having. The rim of this saw contains 125 diamonds embedded in steel, which, when given plenty of water, will cut their way through the hardest marble.

The Vermont Marble Company operates 75 or more quarries with a yearly output of about 1,000,000 cu. ft.

NEW CONCRETE PIER AT HAVANA, CUBA

American Methods and Machines Being Used in Placing 19,500 Cu. Yd. of Concrete on Job

ONE of the largest enterprises going on in Cuba today is the erection of the new Santa Clara reinforced concrete pier at Havana, Cuba. It is being built for the Port of Havana Docks Company and will be leased to the United Fruit Company. The new structure is almost an exact duplicate of the San



HANDLING SAND AND STONE FROM BARGES TO BINS WITH CLAM SHELL

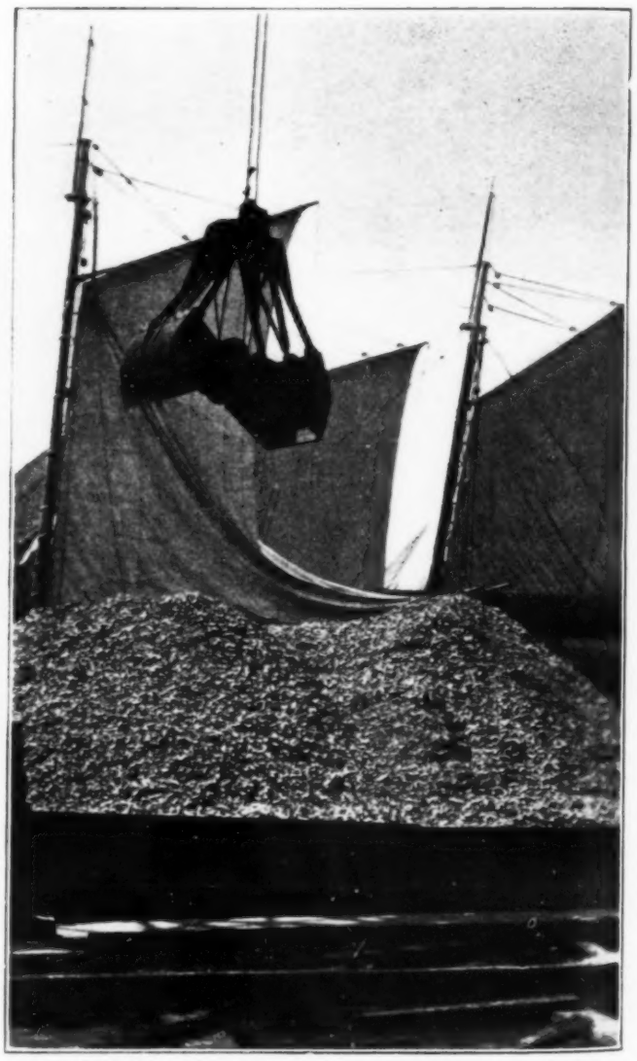
Francisco and Machina piers, which were built for the same owners in 1909.

The San Francisco and Machina piers are 662 and 642 ft. long, respectively, each being 160 ft. wide over all and two stories high. The aprons of the two structures previously built are 5 ft. along the sides and 42 ft. at the outshore end. These side aprons are now being widened out to 30 ft., being similar to those on the new Santa Clara pier.

The three piers are connected by a head house along the bulkhead line. This building varies from 70 to 83 ft. in width and is four stories high in between, and five stories at each pier.

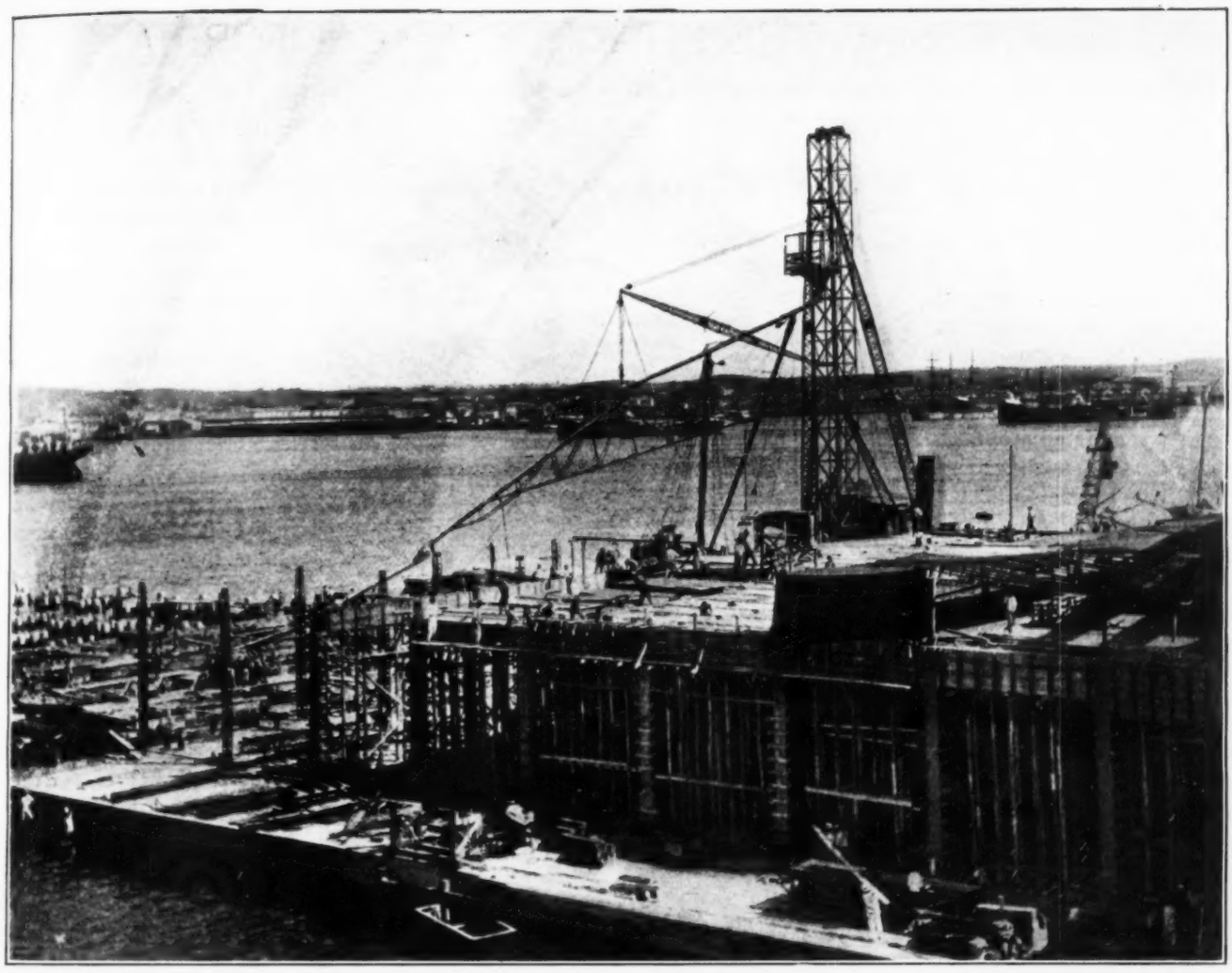
That part of the structure built over the water is supported by reinforced concrete piles 18 in. by 18 in. to 20 in. by 20 in. in section and varying in length from 60 to 85 ft. Approximately 2200 of these piles will be used, a portion of the head house being on the land side of the old bulkhead. This part is built on a foundation made up of 673 native hardwood piles from 40 to 50 ft. long and concrete footings.

All of the piers have double tracks on each apron with a single track around the outshore end and these spurs are connected with the United Railways of Havana.



CLAM SHELL READY TO DIG INTO PILE OF STONE

The sand and stone used are delivered mostly by truck. These trucks empty their contents into the bin of an electrically driven conveyor and are loaded on to barges. This material is then removed from the



TOWER AND CHUTE USED FOR PLACING CONCRETE INTO THE FORMS. THIS PLANT IS MOUNTED ON RAILS

barge with a large steam-operated clam shell and loaded into the concrete mixer. The concrete is placed into the forms with the aid of a tower and spout which are mounted on 4 rails. The tower is 100 ft. high. Approximately 19,500 cu. yd. of concrete will be required.

The construction of the new pier was started April 15, 1922, and will be completed about March 31, 1923. The estimated cost is $2,250,000. Parsons, Klapp, Brinckerhoff & Douglas, consulting engineers of New York, are the designers of these three piers. The Parklap Construction Corporation of New York is the general contractor for the new Santa Clara Pier.

CABLE HAULS MINE LOCOMOTIVE UP MOUNTAINSIDE

THE mine tipple at the plant of the Branch Coal & Coke Co., Elverton, W. Va., like many others in that State, is high up on a mountain side where railroads cannot get at it. Track communication between this mine and the railroad is accomplished by means of an inclined plane.

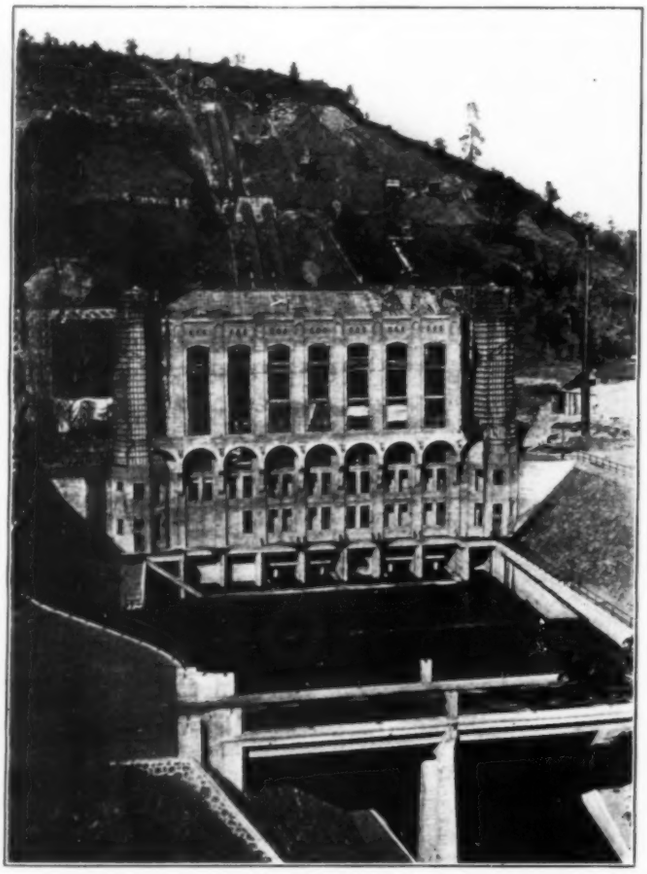
The accompanying photograph shows a new 5-ton mine locomotive on its way up to the mine after being unloaded from the car at the foot of the plane. This incline is 1600 ft. long and has an average grade of 40 per cent. After the locomotive was unloaded, a steel wire rope was attached to it, which in turn was connected to a 6-hp. motor and the trip up was made without mishap. A drag was fitted to the rear of the locomotive as a safety measure, but the operation is considered quite safe, as the strongest of wire rope is used.

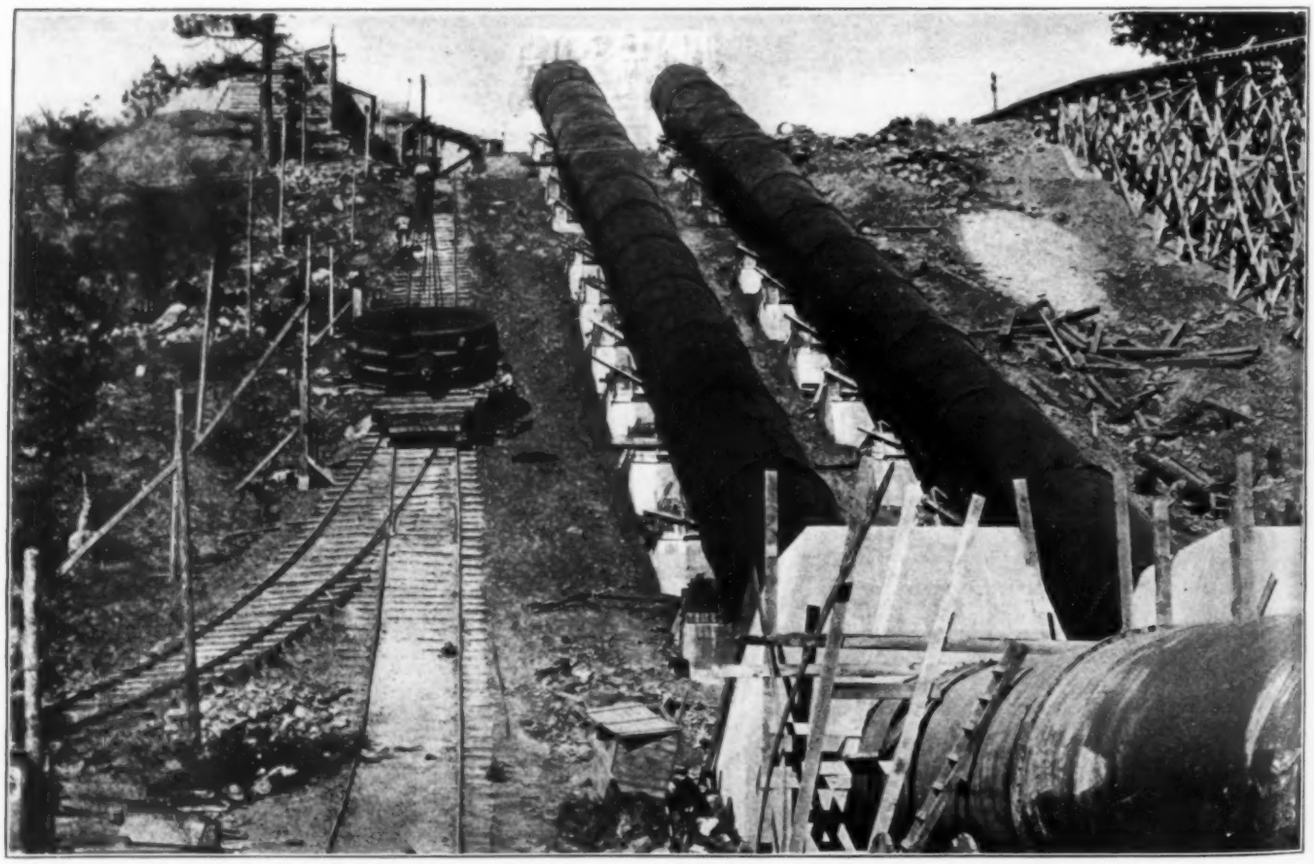
HARNESSING THE PIT RIVER IN CALIFORNIA

By C. W. Geiger

THE Pit River power plant No. 1 of the Pacific Gas and Electric Company of San Francisco is a unit in a string of power developments projected by the company for harnessing the water power of a section of northern California. The first unit recently completed cost $10,000,000 and has the capacity for developing 93,000 hp. When the program of construction is finished, some 13 years from now, an aggregate of about 600,000 hp. in installed capacity will have been bridled on a 60-mile stretch of river and at a final cost of something near $100,000,000.

The magnitude of these figures is only a partial indication of the immensity of the task. Before construction could be started in the far away mountains it was necessary to build a railroad to carry materials into the all but virgin region that had been selected for the site of the new power house. The nearest railroad terminus was at Bartle, 35 miles distant, on the McCloud River railroad, which connects at its outer end with Sisson in the Mount Shasta region. For seven months in the year snow and mud made the roads between Bartle and the scene of operations practically impassable, and at best these roads permitted only the transportation of the most necessary supplies by wagon or sleigh. The engineers warmed up for the big job by building a railroad over the McCloud River divide into Clayton Valley, and thence up the Pit River to the power site.





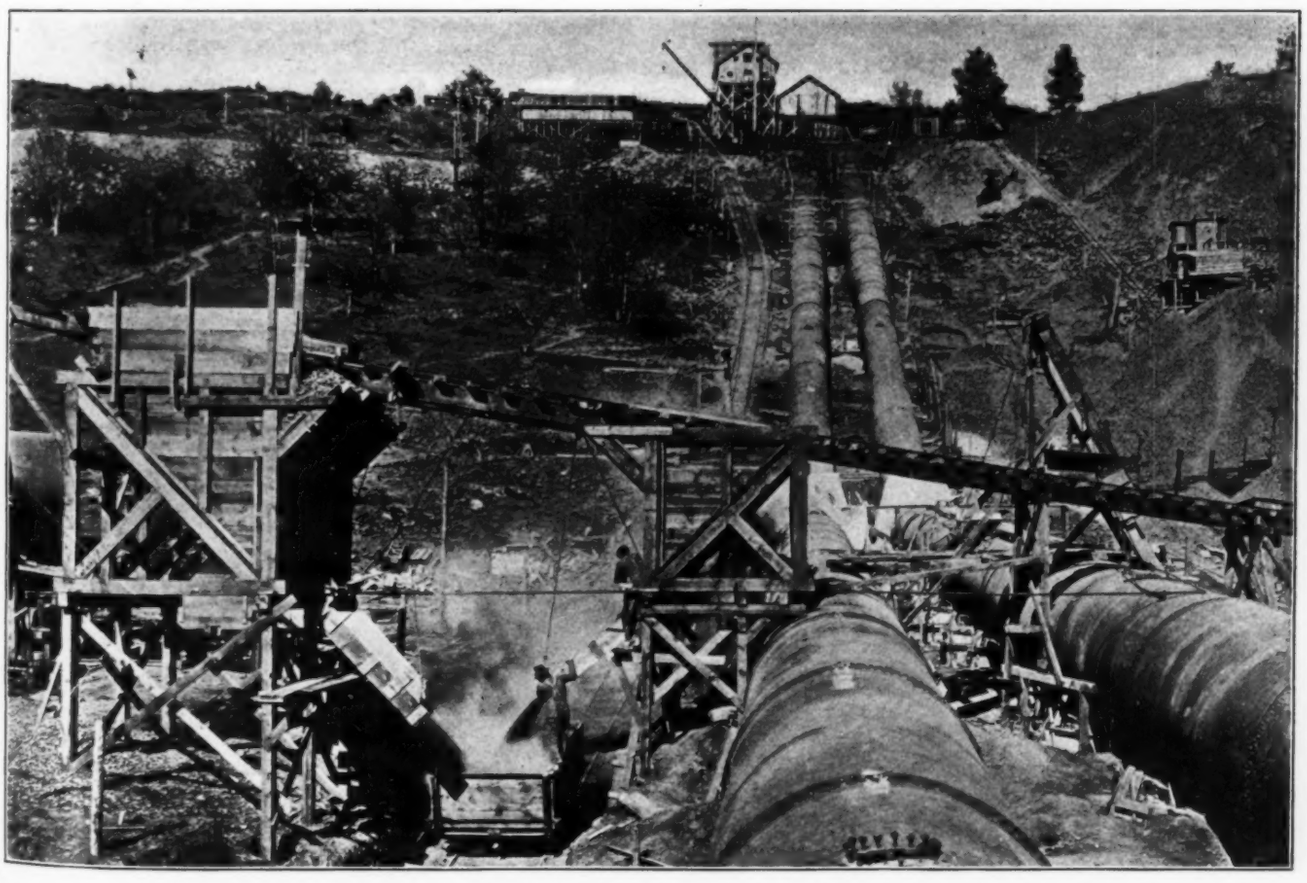
ABOVE: A GENERAL VIEW OF THE POWER HOUSE. BELOW: CLOSE-UP OF PENSTOCKS

When this was done they had to build a tunnel through a mountain. It was planned to direct water from the Fall River through the tunnel to a point in the Pit River canyon 454 ft. above the bank of the stream where the power house was to be built. The reason for this was: The Fall River runs into the Pit River at Fall River Springs, and from that point the Pit River descends due south in a tumble of roughness along the base of a mountain. This abrupt descent involves, of course, a great loss of power. It was therefore planned to tap the Fall River a mile above its junction with the Pit, where it runs smooth, to bring the stream two miles through a tunnel in the intervening mountain, and drop it artificially 454 ft. through penstocks to the power house on the west bank of the Pit River, below the cataract. A concrete diversion dam, 500 ft. in length, was built on the Fall River and from this an intake canal 1000 ft. in length and with a capacity of 1800 ft. per second, was constructed to bring the water to the east portal of the tunnel. The tunnel itself measures 10,160 ft. in length, 14 ft. 3 in. in height and approximately 13 ft. in width.

MATERIAL PILES AT TOP OF HILL

At the west portal of the tunnel, facing the Pit River, was built a large reinforced concrete tank or "surge chamber" about 55 ft. high and of 60 ft. inside diameter. From this huge steel penstocks tapering from 10 ft. 9 in. diameter at the intake to 8 ft. at the power house, were laid upon the hillside to convey the water to the water wheels. The penstocks are 1357 ft. in length and connect with two concrete tunnels 15 ft. in diameter and 185 ft. long, which lead the water underground to the power house.

The rock from the tunnel was piled at the top of the hill, as shown on this page. Here a rock crusher was installed which crushed the rock into aggregate which was transported down the hillside in dump bottom cars to a bin, which was located near the power plant. A track shown in one of the photographs extended across the penstocks. Rock and sand for the penstock anchors were carried by dump bottom cars running on this track. The sand was dumped into a bin on the right side of the tracks and the crushed rock into a bin on the left side. These two materials were run into the cars simultaneously as shown and were hauled up the hillside by means of a cable operated by a hoist located at the top of the hill.



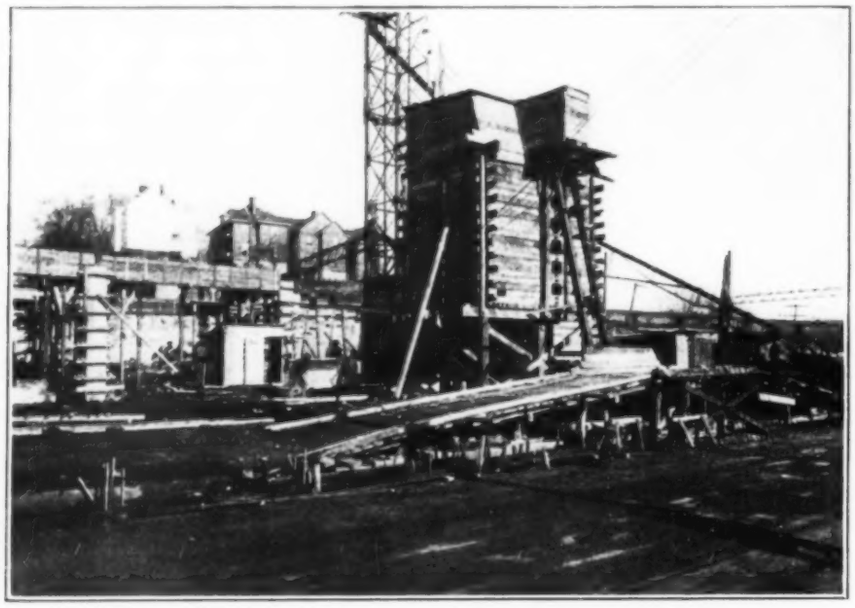
FILLING CARS WITH SAND AND STONE FOR USE IN CONSTRUCTING PENSTOCK ANCHORS

PLANTING THE JOB

Proper Installation of Up-to-Date Equipment Is Vital Factor in Maintaining Costs

By George Elmendorf.
Barney-Ahlers Construction Corporation.

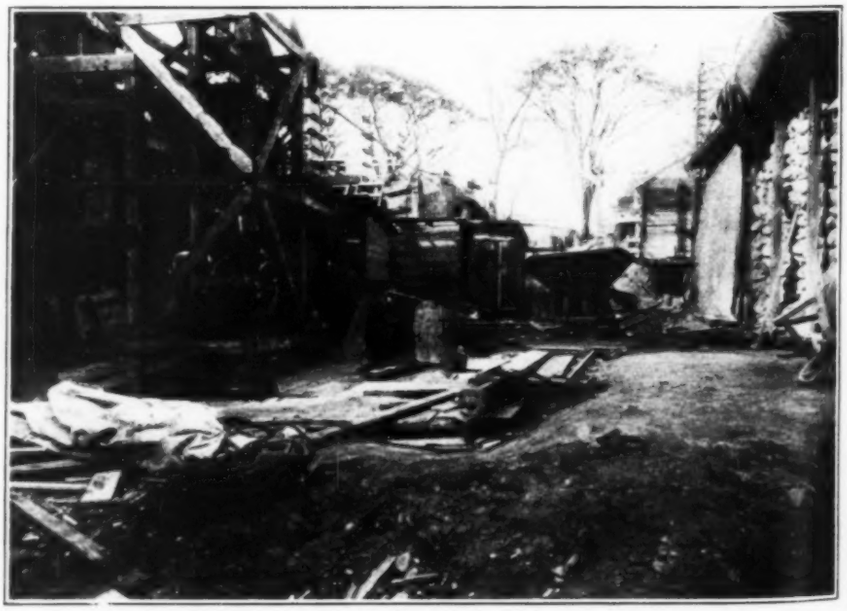
IN the construction of reinforced concrete buildings, or for that matter in carrying on any important building job, the plant layout receives more attention today than ever before. Successful contractors realize that the old way of putting on the job whatever equipment happens to be handy is not the best way to overcome the two great bugbears of the construction business at the present time—the high cost of labor and labor shortage. A contractor is really a manufacturer working under unusually difficult conditions. His plant, like his organization, must be built for each operation. The proper installation of his equipment is a vital factor in maintaining his costs, and while it is not possible to standardize fully on construction plant, it is possible after a study of material-handling and labor-saving machines to keep account of layouts and costs until the best methods and machines are decided upon. Where a contractor specializes in certain classes of work, this process may be refined still further.



AN INSTALLATION PLANNED FOR LIMITED SPACE

The illustrations accompanying this article were taken on concrete warehouse construction under the direction of the Barney-Ahlers Construction Corporation of New York City. The upper view shows an installation where the storage space was somewhat limited, and where it was necessary to plan for winter work. A ¾-yd. mixer set in a pit flush with the ground served a tower and steel chute which were used to distribute the concrete. Sand and stone, brought in in motor trucks, were dumped through a grizzly into a bucket conveyor and elevated into the storage bin. This bin was equipped with steam coils and live steam was supplied from a separate boiler. A gate was placed directly over the hopper, which fed the aggregate to the mixer.

This layout, which required a minimum of labor—one hoisting engineer and a man on cement and trimming at the grizzly—proved very satisfactory. The job, a five-story 94-ft. by 165-ft. reinforced concrete flat slab warehouse for the Willowbrook Dairy at Mt. Vernon, N. Y., was started by the Barney-Ahlers Corporation Nov. 22, 1921, and the roofing was applied March 28, 1922. During freezing weather in addition to the steam coils in the material bins and the heating of the water, the concrete slabs were covered with tarpaulins about 18 in. above the slab. The lower floors

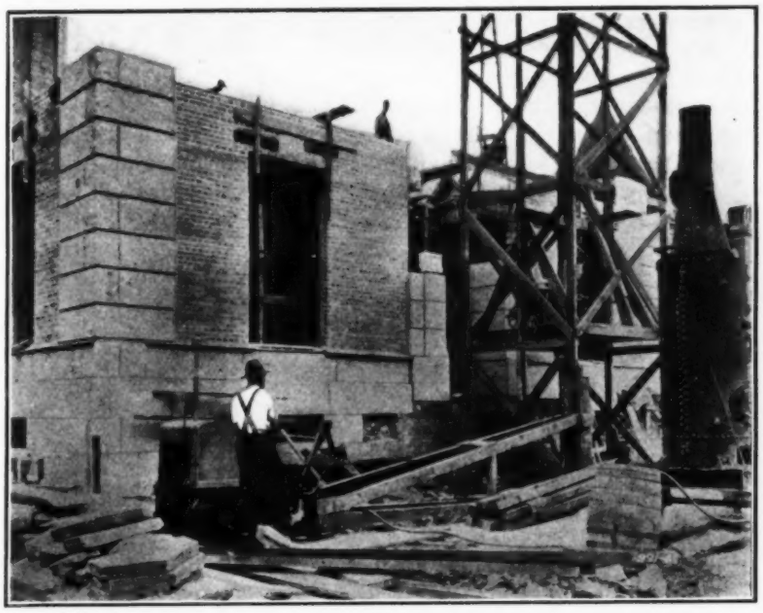


WHERE MORE ROOM IS AVAILABLE THIS LAYOUT IS USED

were inclosed in canvas and heat was furnished by salamanders. Small holes left in the floor slab at frequent intervals allowed the heat to ascend from the salamanders below.

The lower illustration on page 16 shows quite a different layout but equally satisfactory. On this job it was possible to take advantage of the contours of the site and the dimensions of the building (60 ft. by 180 ft.). A bin holding about 400 cu. yd. of material was built at a height sufficient to allow a tunnel underneath for the entire length. Material was received at the street level and dumped into the bin. Tunnel gates were used to charge V-dump cars which transported the sand and stone over industrial track to the mixing plant, which was located at the center of the building. This plant required one additional man on the dump cars.

Another feature of plant installation which has caused contractors much thought and worry is the question of power. While electricity is the ideal drive, it has not been standardized and the equipment required to meet the different current characteristics runs into considerable capital. The installation cost of electric service is also a large item, ranging from $200 to $700 per job. Steam has advantages, especially when doing work in winter weather when material must be heated. Steam equipment has disadvantages, however, such as requiring licensed operators, expensive installations and fuel expenditures. Probably the most satisfactory source of power today is the modern 4-cylinder gasoline engine, which provides a quick, cheap installation and may be depended upon for faithful service on the medium-sized job.



FOUR-CYLINDER SINGLE FRICTION DRUM GASOLINE HOIST

The installation in the photograph on this page is an example of the successful use of single friction drum hoists with 15-hp. 4-cylinder gasoline engines. It shows the introduction of an independent clutch elevator sheave which permits double cage operation and in addition leaves the friction drum for hoisting forms, reinforcing, etc. This hoist is provided with double cone friction and foot brake. On the left side is the elevator sheave operated by clutch, so that the sheave can be run in either direction and the hoist drum still be free for operation.

The gasoline builders' hoist is a complete unit and may be had in double-drum of capacity sufficient to handle a yard concrete bucket. The particular advantage of this unit over the ordinary steam or electric hoist, in addition to those already mentioned, is that while the driving gear of the friction drum is non-reversible, the elevator sheaves by means of two separate clutches are able to reverse at will. Contractors find this feature eminently satisfactory.

FIGHTING THE TEREDO IN LOS ANGELES

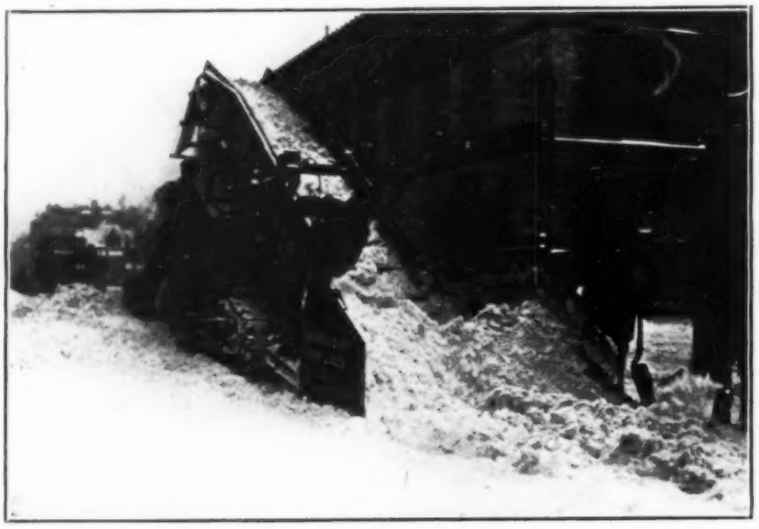
THE Los Angeles Harbor Department has evolved a process by which it hopes to protect its wharves and docks from the onslaughts of the teredo, arch enemy of the shipping industry, and to save the shipping interests a vast amount of money, which they must spend each year to replace piling destroyed by this marine worm. The piles are prepared in the usual manner and are then boiled for thirty hours in a tar-like solution. The result is a piling that the worm does not appear to be able to get into and, therefore, his destructive activities appear to be nullified.

© P & A Photos

The teredo is an inhabitant of most harbors and does thousands of dollars' worth of damage each year to wharves, docks and ships. Many methods have been tried to combat the worm, but none has been absolutely successful. Notable among the investigations being made to find a way to combat this marine borer is that of the National Research Council. This body is gathering information as to the various species of these animals infesting United States harbors.

LOADERS JOIN BOSTON'S SNOW FIGHTING FLEET

IN the recent heavy snowstorms which visited Boston great interest was shown in the performances of the various mechanical devices used for removing snow from the streets. Among these were two mechanical loaders owned by the Boston Elevated Railway, which made remarkable records both in the number of hours in continuous service and in the amount of snow removed from the streets.



On Wednesday morning, January 3, one of the loaders owned by the company was put into service. From that time until 1 o'clock the following Monday morning it worked constantly, having made a continuous run of 112 hr. without any inspection. Then it was pulled off the job, oiled and greased and put into operation again, remaining at work until its services were no longer needed. The other loader did its work equally well. All sections of the city benefited by their speed, efficient work having been done around Harvard College and the Massachusetts Institute of Technology as well as in the more congested districts around the South Station, Post Office Square and in the Back Bay.

The Boston Elevated used 14 trucks to each snow loader. The average distance hauled was about 1¼ mi., the snow having been dumped from bridges into the river and in some cases into the large sewers. Trucks averaging 7 yd. were used. These trucks were frequently loaded in less than a minute and one loading was noted in 43 seconds. The average was 25 trucks per hour.

One man operated the loader and one or two others rode on the platform to turn back the snow that at times rose high above the sides of the digging hopper. Frequently large chunks of snow weighing from 250 to 300 lb. were loaded on the trucks. It is estimated that each loader did the work of from 150 to 200 men.

James Smith is Superintendent of Transportation of the Boston Elevated Railway.

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TEAMS AND SCOOPS USED IN SEWER EXCAVATION

By Ivan E. Houk, City Engineer, Dayton, Ohio

TEAMS and scoops are being used to advantage in excavating for a 66-in. storm sewer being installed through the city yards in Dayton. The yards are located on an old city dump, and consequently,

TEAM DRAWS LOADED SCOOP OUT OF TRENCH

everything from ashes to bed springs is encountered in the excavation. Nevertheless, the material is so loose that it can be scooped out without picking or rooting, except for a depth of a foot or so near the surface where the soil has been compacted, and an approximately equal depth near the bottom where natural clay soil is found. Inasmuch as the trench is about 25 ft. deep and 8 ft. wide, it was hardly feasible to use a trenching machine or any other type of equipment generally used in sewer work and to purchase special machinery adapted to the conditions was out of the question, owing to the comparatively short

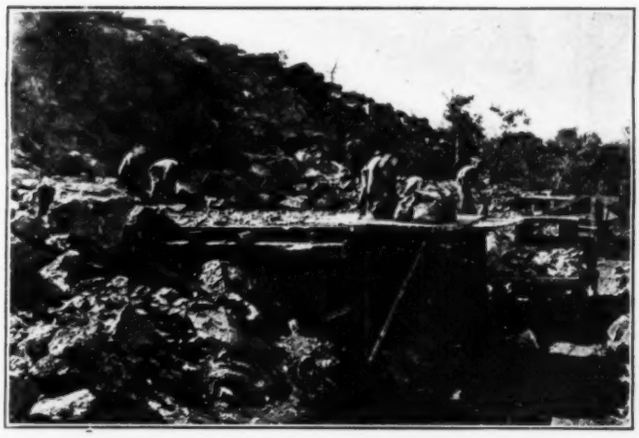
BACKFILLING THE COMPLETED TRENCH

stretch of sewer to be installed. An engine and tipple could have been rented, as had been done on other sewer work during the last year, but it would have been necessary to rent them by the month, whereas the teams can be laid off during rainy or inclement weather the same as laborers.

Only two teams and scoops are being used. A cable, attached to a scoop, and of sufficient length to reach from the bottom to the top of the trench, is passed through a sheave at the open end of the trench so that the team can walk back along the excavated portion when pulling up the loaded scoop, this being necessary on account of the cramped quarters. The detailed operations are shown in the accompanying photographs. When the scoop arrives at the ground surface the cable is unhooked and the scoop hitched to the second team. The second team then hauls it back to the completed section of the sewer and dumps it into the trench while the first team is backing up and pulling out another loaded scoop. In this way both teams are kept moving constantly. The trench is sheeted solid so as to avoid any danger due to caving.

The work is being done by the Division of Engineering, and is in the direct charge of E. V. Roode, assistant engineer, and H. E. Worth, superintendent.

LOADING ROCK ON MOTOR TRUCKS

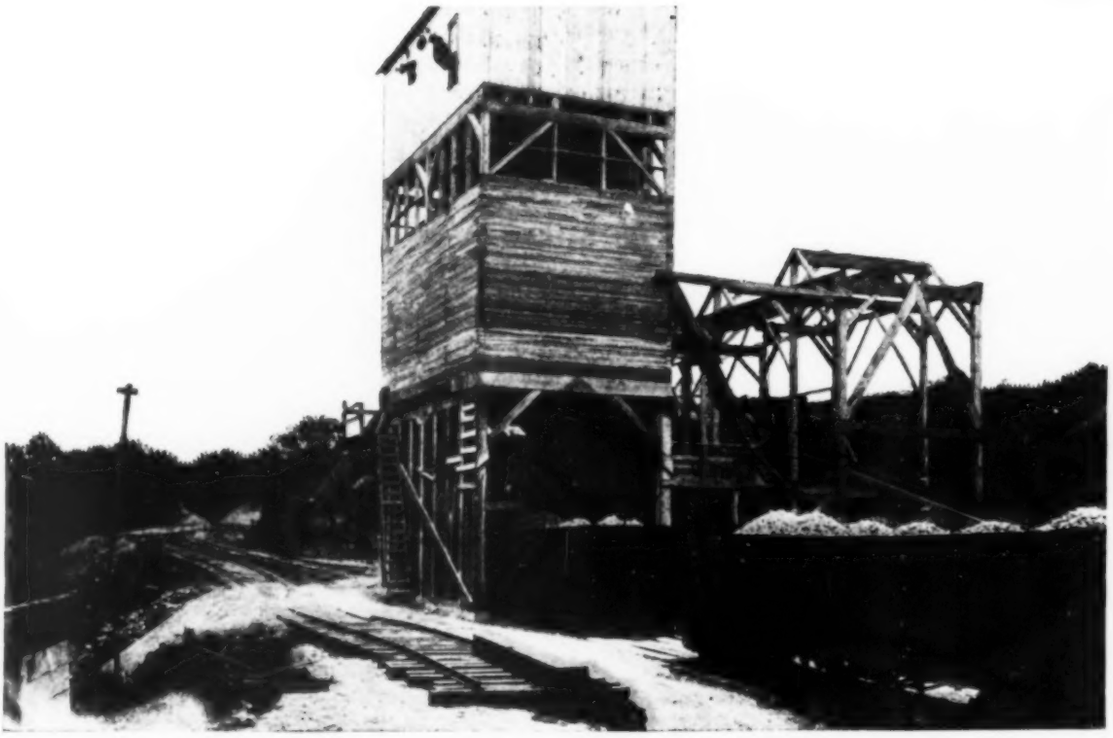


LOADING A TRUCK REQUIRES BUT A SECOND

THE accompanying photograph shows the novel method employed at a rock quarry on the Pit River power project in northern California in loading rock on to motor trucks. A description of the beginning of this project is given on pages 14 and 15 of this issue. The outer section of the loading platform is hinged to permit rapid loading of the truck. While the truck is delivering one load the workmen are placing another load on the loading platform. When the truck is in place the tilting platform is released.

AT WORK IN THE CANADIAN ROCKIES

THE photograph on the cover for this month was taken last August and shows a road gang at work at MacLeod Meadows, Kootenay Park, Canada. The loader illustrated is in the service of the Canadian National Parks and is working on the Banff-Windermere Road in the Canadian Rockies. This road is 40 miles from the nearest railroad line. The Brisco Range of the Rocky Mountains is in the background.



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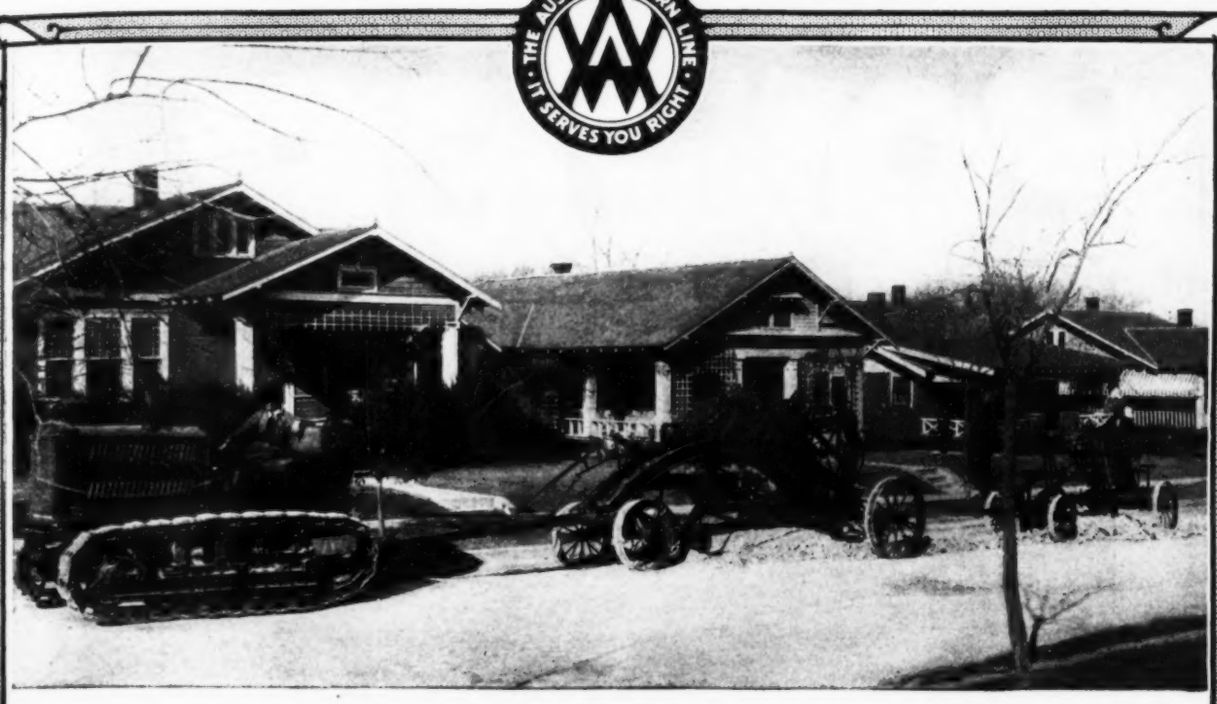

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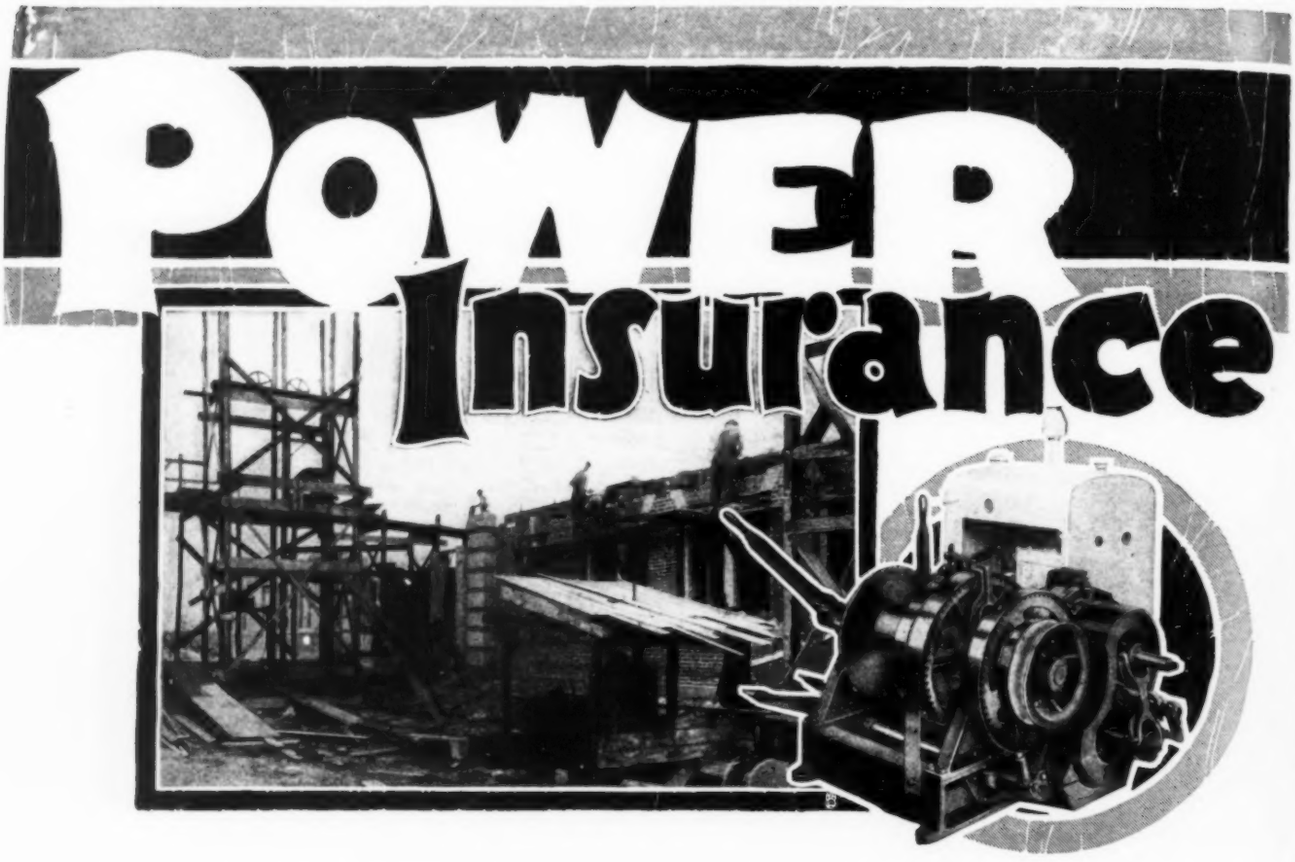

If the salient features of the Clyde reversible gasoline engine builders hoist were to be enumerated, they would include portability, adaptability and the complete independence from any outside source of power. From the contractors' viewpoint, it would be hard to name three more important essentials.

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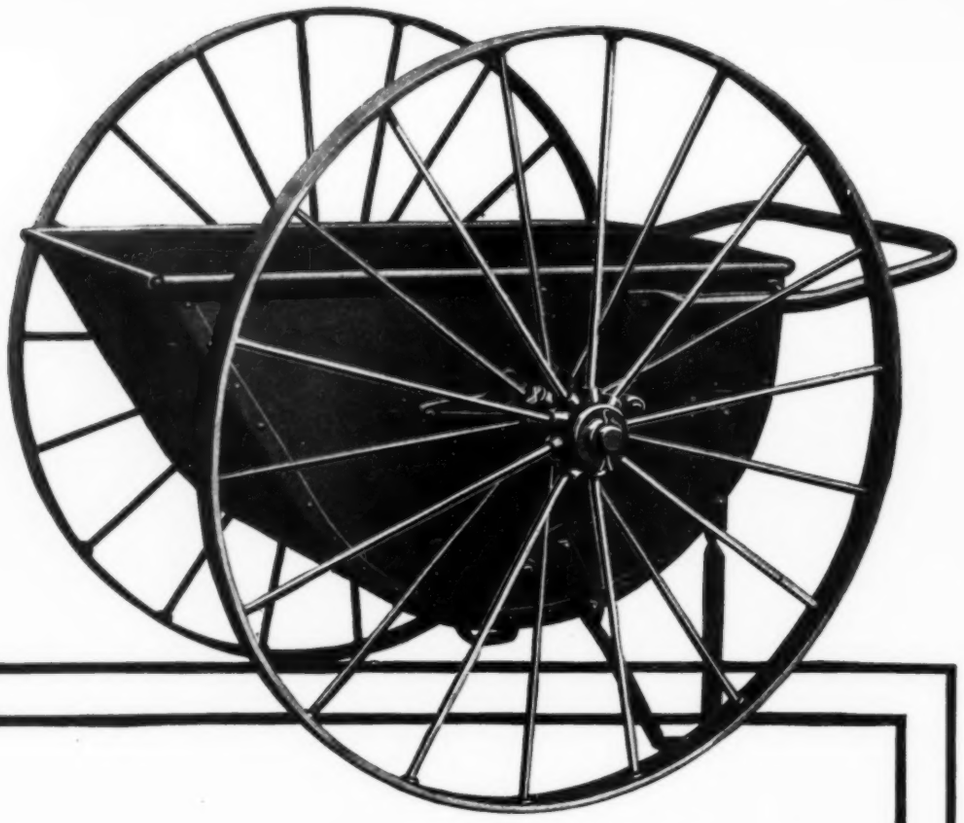

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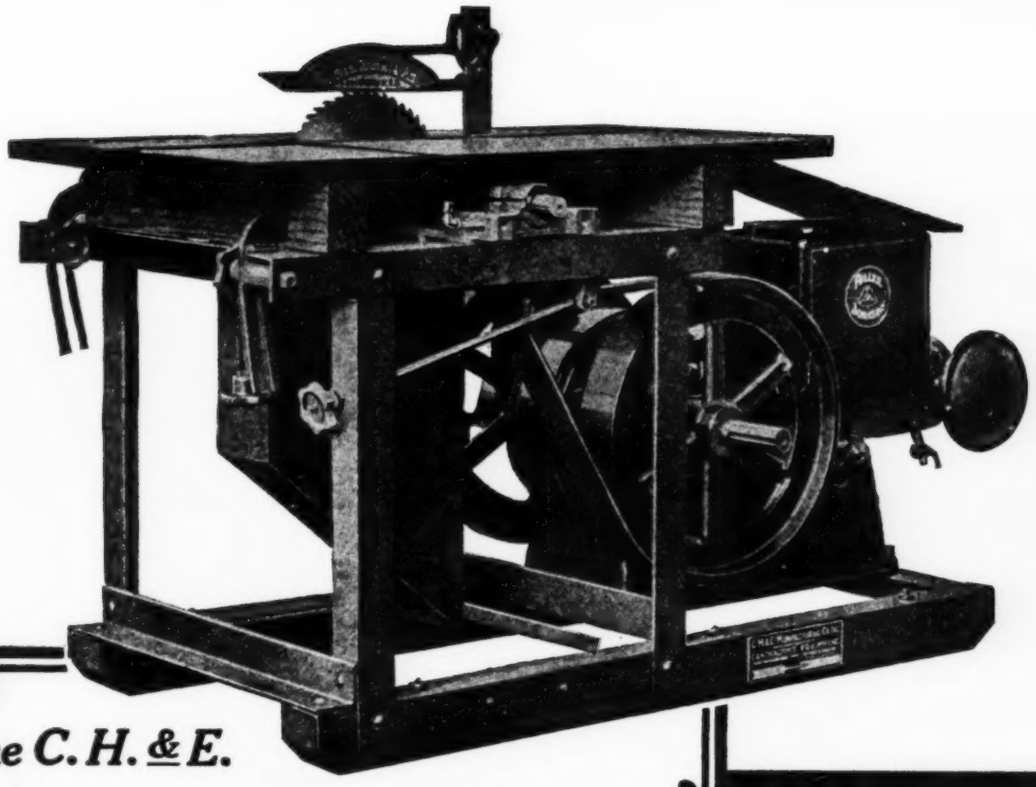

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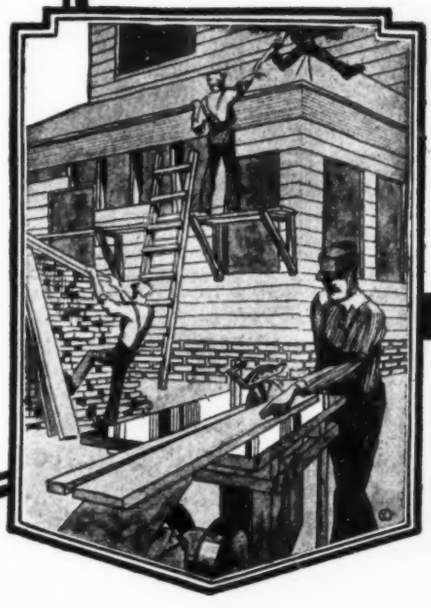

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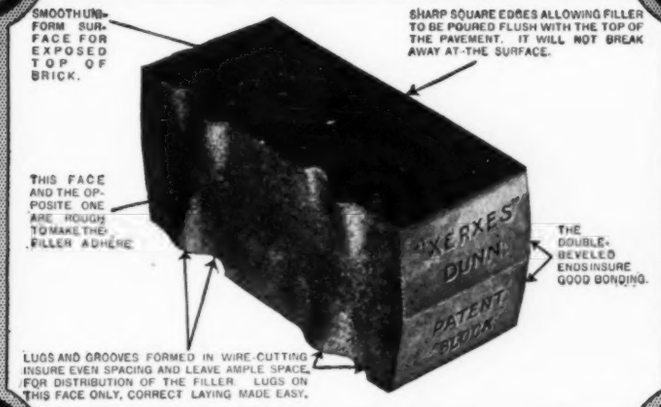
WIRE-CUT LUG BRICK

A Wire-Cut Lug Hillside Brick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End View—Two Wire-Cut Lug Brick—Note joint spacing

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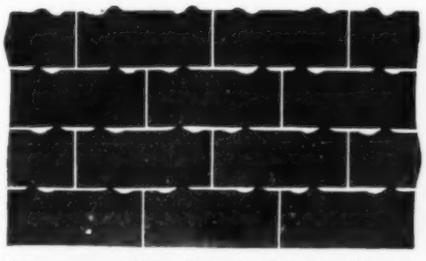

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The Business End

Do you ever stop to think that present day methods require more things of a boom than were ever conceived in early shovel days? Even five years have made a difference.

This is why Thew has not followed the old fashioned designs but has taken steps to perfect a boom designed and built on engineering principles backed by over twenty-five years of experience.

Plate girder construction is not new but it is new for small shovel booms as applied by Thew. The side members are built like a bridge, further stiffened by T-rails which also act as dipper guides. To give flexibility and confine it to the proper places these members are connected by seasoned oak blocking and held together by through bolts easy to take up. The boom hinges are of cast steel with a wide spread. No truss rods required.

Naturally the boom engine has three point support and it gets its steam through the swivel joint on the hinge pin instead of the old cumbersome piping and ball joints.

Good engineering requires gears on each side of the boom but Thew has gone farther by adding an intermediate shaft which guarantees that the dipper goes up and out and stays there without drifting.

Ask any Thew owner or write us.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

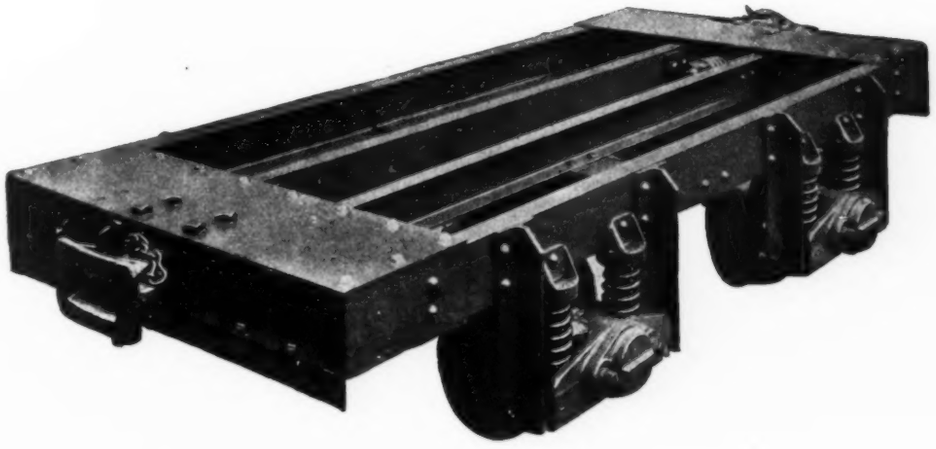
30 CHURCH ST.
NEW YORK CITY

MONADNOCK BLOCK
CHICAGO

FRANKLIN TRUST BLDG.
PHILADELPHIA

RAILWAY EXCHANGE BLDG.
KANSAS CITY, MO.

Introducing
To Concrete Road Builders



The Western Heavy-Duty Truck

A "1923 model" improved Western Truck for carrying Batch Boxes

Every effort has been made to meet with this improved model all demands of the contractors for a truck large enough and strong enough to permit maximum production with a minimum of maintenance cost and delay.

Longer than the original truck, the Western Heavy-Duty Road Builders Truck will comfortably carry two 37 cu. ft. batch-boxes.

Its larger axles, larger bearings and longer and heavier journal box springs increase its strength immensely.

In the journal box is a removable manganese steel sleeve to take the wear.

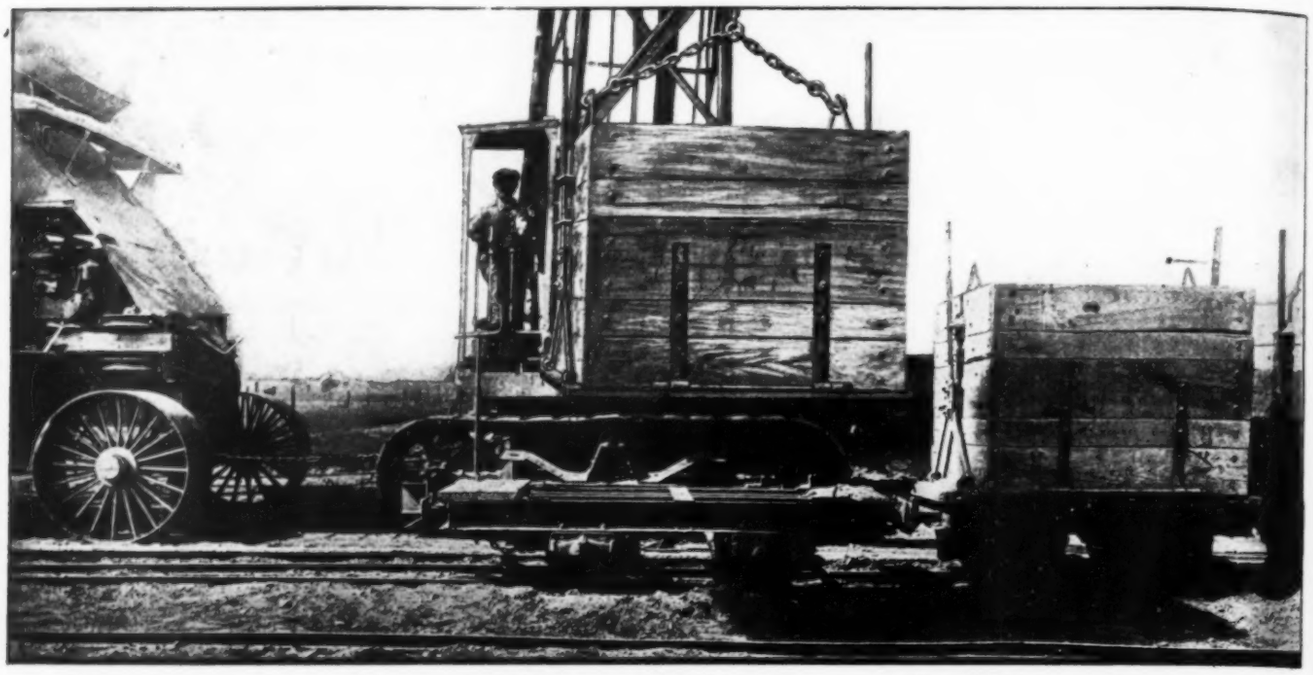
The centers of the springs, pedestal guides and bearings are in perfect alignment, reducing wear and adding to the track-riding qualities of the truck.

Our Concrete Roads Catalog No. 56, just off the press, will give you all further details of this latest improvement in industrial haulage.

Western Wheeled Scraper Company

Earth and Stone Handling Equipment

Aurora ∴ ∴ ∴ ∴ Illinois



Building ¼ Mile Of Road Per Day!

Building 1320 feet of road per day, one mile in four days, is only possible when dependable, non-stop equipment is used.

Koppel industrial cars equipped with Hyatt roller bearings cost a little more than ordinary cars but return their extra cost in continuous service with a minimum of attention and no bearing replacements.

The true rolling motion of Hyatt bearings enables locomotives to haul more cars per train and reduces gasoline costs; the positive lubricating action of the bearings makes it only necessary to add grease once a season; and the durable steel rollers are designed to carry their loads capably throughout the life of the equipment.

To make new records, to complete contracts with consistent profits, buy Hyatt equipped cars, locomotives, and mixers.

During the building of the road from Muskegon to Grand Rapids Mr. G. P. Scharl established a new record by completing one mile of 18' wide, 7" and 8" thick concrete road in four days. Hyatt roller bearing equipped Koppel cars aided in making this record.

Hyatt Roller Bearing Company

Worcester—New York—Newark
Philadelphia—Pittsburgh—Huntington
Cleveland—Buffalo—Chicago—Detroit
Indianapolis—Milwaukee—Minneapolis
San Francisco

Mount this Crane On Your Used Motor Truck

Lose no Time Getting from Place to Place
Earn or Save from $50 to $200 a Day

THE Universal Crane with its motor truck or rubber-tired trailer mounted is by far the most flexible crane for general construction work. The machine in the upper illustration has loaded as many as 66 trucks in 8 hours and on another job unloaded 8 to 10 cars of material a day.

No time is lost when the machine is to be moved to another job. The lower photograph shows the ease with which the crane can handle loaded batch boxes for concrete work.

A number of contractors have purchased duplicates of their first portable Universal because of their dependability on a job and——

1. The ability to get from job to job at *Motor Truck Speed.*
2. The stability. (Center of Gravity lower than a loaded 5-ton dump truck.)
3. No outriggers necessary—permitting travel with load.
4. Continuous Service with exceptionally few repairs.
5. Full Circle Swing at 5½ R. P. M.

Crane is a *complete separate power unit* under perfect balance at clevis connection so it can be easily transferred from one mounting to another (listed below) as the job requires.

Crane and motor truck operated by one man.

Write for Bulletin 15-H illustrating different mountings adaptable to contract work.

MOUNTINGS—Motor Truck—New or Used; Trailer—Rubber-Tired, Elliptic Springed; Steel Wheel Spring Mounted Yard Trucks; R. R. Flatcar Carriage—Movable or Fixed; Continuous Tread, Etc.
Spring Mounted Yard Trucks; R. R. Flatcar Carriage—Movable or Fixed; Continuous Tread, Etc.

EQUIPMENT—Clamshell or Dragline Bucket Drums; Lifting Magnet—Exciter Generator; Various Length Booms; Skimmer Bucket and Other Equipment for Special Jobs.

POWER—Gasoline or Electric—100% overpowered.

BOOM HOIST—High Speed Power Controlled Raising and Lowering.

OPERATING COST—$10 to $15 a day.

Send Now for Our General Catalogue 15K or Contractors' Bulletin No. 21.

The UNIVERSAL CRANE CO.

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402 Van Nuys Bldg., Los Angeles, Calif.
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New York Office:
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In One Hour You Can Inspect Road-Building Layouts in Eleven States

By sending for this free book you get descriptions and photographic views of the material handling methods developed by twenty-four leading contractors in 1922

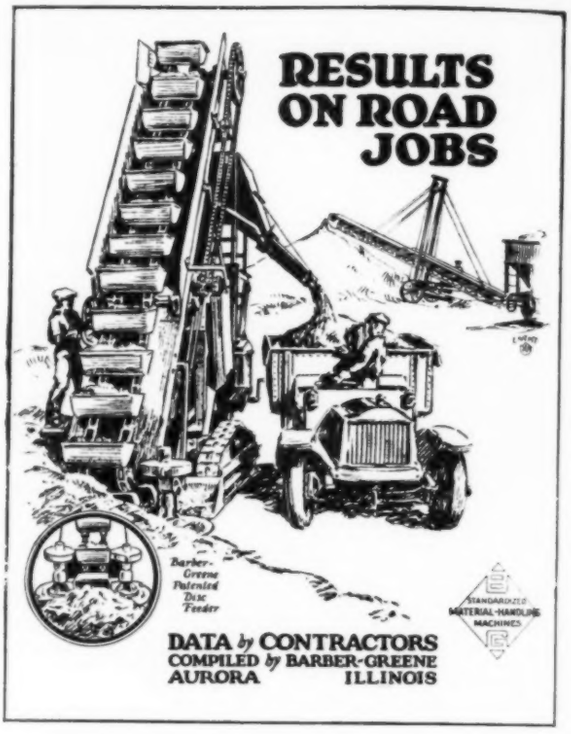
Few contractors can ever afford the time required for visiting twenty four other road-builders working in eleven states and in two provinces of Canada.

By sending for the free book shown on this page you can, however, get practically all the essentials of the methods used by twenty-four representative contractors in 1922.

Their principal problem, like that of practically all other road-builders, is that of speeding up the flow of materials at as low a cost as possible.

What they did to solve the problem in 1922—the methods they employed, the layouts they designed, the results they got—are detailed and pictured in the 1923 edition of "Results on Road Jobs."

The layouts shown in the book are representative of those used by 200 contractors using our equipment.



Some of the subjects presented in this 1923 edition of "Results on Road Jobs," are:
The Shortest Industrial System of Record—
The World's Record for Laying Concrete Pavement—
Small Stock Piles, a Central Storage Plant, and a Track—
Replacing 18 men in Handling Crushed Rock—
The State of Illinois, Big Trucks, and a 32-E—
Checking Batches with a Measuring Hopper—
New Ways for Unloading Cars—
Making One Man Replace a Gang in City Paving Work—
Laying City Pavements without Employing a Single Shoveler—

So the book really shows you not only what twenty-four contractors have done, but also what 200 contractors have found practical, economical and necessary.

Send for your copy today. It may be of exceptional interest to you right now in connection with the advance storage of materials.

In any case it is certain to give you interesting suggestions for planning your storage and reclamation for the coming season.

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Portable Belt Conveyors — Self Feeding Bucket Loaders